doubtnut
India's Number 1 Education App

MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

INTEGRALS

Others

1. If $\int \frac{dx}{x^2 + ax + 1} = f(g(x)) + c,$ then $f(x)$ is inverse trigonometric function for $|a| > 2$ $f(x)$ is logarithmic function for $|a| < 2$ $g(x)$ is quadratic function for $|a| > 2$ $g(x)$ is rational function for $|a| < 2$

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2. If $f(x) = \int \frac{x^8 + 4}{x^4 - 2x^2 + 2} dx$ and $f(0) = 0, then$ (a)$f(x)$ is an odd function (b) $f(x)$ has range R (c)$f(x)$ has at least one real root (d)$f(x)$ is a monotonic

function.

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3. $\int \frac{dx}{(x+1)(x-2)} = A\log(x+1) + B\log(x-2) + C$, where

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4. Each question has four choices, a,b,c and d, out of which only one is correct. Each question contains STATEMENT 1 and STATEMENT 2. (a) If both the statements are TRUE and STATEMENT 2 is the correct explanation of STATEMENT 1. (b) If both the statements are TRUE but STATEMENT 2 is NOT the correct explanation of STATEMENT 1. (c) If STATEMENT 1 is TRUE and STATEMENT 2 is FALSE. (d) If STATEMENT 1 is FALSE and STATEMENT 2 is TRUE. Statement 1: $\int e^x \sin x dx = \frac{e^x}{2}(\sin x - \cos x) + c$ Statement 2: $\int e^x \left(f(x) + f'(x)\right) dx = e^x f(x) + c$

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5. If $\int \frac{x^2 - x + 1}{\left(x^2 + 1\right)^{\frac{3}{2}}} e^x dx = e^x f(x) + c$, then (a) $f(x)$ is an even function (b) $f(x)$ is a bounded function (c) the range of $f(x)$ is $(0, 1)$ (d) $f(x)$ has two points of extrema

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6. $If \int \frac{x^4 + 1}{x^6 + 1} dx = \tan^{-1} f(x) - \frac{2}{3} \tan^{-1} g(x) + C, then$ both $f(x) and g(x)$ are odd functions $f(x)$ is monotonic function $f(x) = g(x)$ has no real roots $\int \frac{f(x)}{g(x)} dx = -\frac{1}{x} + \frac{3}{x^3} + c$

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7. If $\int \sin^{-1} x \cos^{-1} x dx = f^{-1}(x) \left[\frac{\pi}{2} x - x f^{-1}(x) - 2\sqrt{1 - x^2}\right] + 2x + C, then$ $f(x) = \sin x$ (b) $f(x) = \cos x$ $A = \frac{\pi}{4}$ (d) $A = \frac{\pi}{2}$

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8. If $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx = A\cos 4x + B$, *then* (a)$A = -\frac{1}{8}$ (b) $B = \frac{1}{2}$ (c) $f(x)$ has fundamental period $\frac{\pi}{2}$ (d)$f(x)$ is an odd function

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9. Statement 1: $\int \frac{dx}{x^3\sqrt{1 + x^4}} = -\frac{1}{2}\sqrt{1 + \frac{1}{x^4}} + C$ Statement 2: For integration by parts, we have to follow ILATE rule. Which of the following Statements is/are correct ?

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10. Statement 1: $\int \frac{\sin x dx}{x}, (x > 0)$, cannot be evaluated. Statement 2: Only differentiable functions can be integrated.

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11. $\int \frac{4e^x + 6e^{-x}}{9e^x - 4e^{-x}} dx = Ax + B\log\left(9e^{2x} - 4\right) + C$, *then* A=_____ _, B=_____, C=_____

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12. The value of the integral $\int \frac{\cos^3 x + \cos^5 x}{\sin^2 x + \sin^4 x} dx$ is

$\sin x - 6\tan^{-1}(\sin x) + C$

$\sin x - 2(\sin x)^{-1} + C$

$\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x) + C$

$\sin x - 2(\sin x)^{-1} + 5\tan^{-1}(\sin x) + C$

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13. Evaluate: $\int \sin^{-1}\left(\frac{2x + 2}{\sqrt{4x^2 + 8x + 13}}\right) dx$

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14. Evaluate: for $m \in N$, $\int x^{3m} + x^{2n} + x^{m} \Big) \left(2x^{2m} + 3x^{m} + 6\right)^{\frac{1}{m}} dx, x > 0$

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15. Evaluate: $\int \frac{\cos^4 x}{\sin^3 x \left(\sin^5 x + \cos^5 x\right)^{\frac{3}{5}}} dx$

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16. Evaluate: $\int \sqrt{1 + \operatorname{cosec} x} dx, \left(0 < x < \frac{\pi}{2}\right)$

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17. $\int \frac{x^2 - 1}{x^3 \sqrt{2x^4 - 2x^2 + 1}} dx$ is equal to (a) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x^3} + C$ (b) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x} + C$ (c) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x^2} + C$ (d) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{2x^2} + C$

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18. The integral $\int \frac{\sec^2 x}{(\sec x + \tan x)^{\frac{9}{2}}} dx$ equals (for some arbitrary constant K)

$-\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$

$\frac{1}{(\sec x + \tan x)^{\frac{1}{11}}} \left\{ \frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$

$-\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$

$\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$

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19. Evaluate: $\int \frac{dx}{x^3\sqrt{x^2 - 1}}$

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20. Evaluate : $\int \frac{2x}{\left(1 - x^2\right)\sqrt{x^4 - 1}} dx$

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21. Evaluate: $\int \sqrt{\sec x - 1} dx$

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22. Evaluate: $\int \sqrt{\frac{3 - x}{3 + x}} \sin^{-1}\left(\frac{1}{6}\sqrt{3 - x}\right) dx$

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23. Evaluate: $\int \frac{(1 - x\sin x)dx}{x\left(1 - x^3 e^{3\cos x}\right)}$

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24. Evaluate: If $\int \cos^n x dx$ prove that $I_n = \frac{1}{n}\left(\cos^{n-1} x \sin x\right) + \left(\frac{n-1}{n}\right) I_{n-2}$

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25. Evaluate: $\int \frac{x^2 - 1}{x\sqrt{\left(x^2 + \alpha x + 1\right)\left(x^2 + \beta x + 1\right)}} dx$

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26. Evaluate: $\int \frac{e^{\tan^{-1} x}}{\left(1 + x^2\right)} \left[\left(\sec^{-1}\sqrt{1 + x^2} + \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right)\right)\right] dx, (x > 0)$

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27. $\int \frac{\sqrt{x - 1}}{x\sqrt{x + 1}} dx isequa < o$

$\ln\left|x - \sqrt{x^2 - 1}\right| - \tan^{-1} x + c$

$\ln\left|x + \sqrt{x^2 - 1}\right| - \tan^{-1} x + c$

$\ln\left|x - \sqrt{x^2 - 1}\right| - \sec^{-1} x + c$

$\ln\left|x + \sqrt{x^2 - 1}\right| - \sec^{-1} x + c$

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28. $IfI = \int \frac{dx}{\left(2ax + x^2\right)^{\frac{3}{2}}}$,then I is equal to (a)- $\frac{x + a}{\sqrt{2ax + x^2}} + c$ (b) $-\frac{1}{a}\frac{x + a}{\sqrt{2ax + x^2}} + c$ (c)- $\frac{1}{a^2}\frac{x + a}{\sqrt{2ax + x^2}} + c$ (d) - $\frac{1}{a^3}\frac{x + a}{\sqrt{2ax + x^3}} + c$

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29. If $f^{'}(x) = \frac{1}{-x + \sqrt{x^2 + 1}}$ and $f(0) = \frac{1 + \sqrt{2}}{2}$ then $f(1)$ is equal to- (a) $\log\left(\sqrt{2} + 1\right)$ (b) 1 (c)$1 + \sqrt{2}$ (d) none of these

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30. $\int e^x\left(\frac{2\tan x}{1 + \tan x} + \cot^2\left(x + \frac{\pi}{4}\right)\right)dxisequa < o$ $e^x\tan\left(\frac{\pi}{4} - x\right) + c$ $e^x\tan\left(x - \frac{\pi}{4}\right) + c$ $e^x\tan\left(\frac{3\pi}{4} - x\right) + c$ (d) none of these

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31. The value of the integral $\int\left(x^2+x\right)\left(x^{-8}+2x^{-9}\right)^{\frac{1}{10}}dx$ is $\frac{5}{11}\left(x^2+2x\right)^{\frac{11}{10}}+c$ (b) $\frac{5}{6}(x+1x)^{\frac{11}{10}}+c$ $\frac{6}{7}(x+1)^{\frac{11}{10}}+c$ (d) none of these

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32. $If\int\frac{dx}{(x+2)\left(x^2+1\right)}=a\ln\left(1+x^2\right)+b\tan^{-1}x+\frac{1}{5}\ln|x+2|+C$ Then (a) $a=\frac{1}{10}, b=-\frac{2}{5}$ (b) $a=\frac{1}{10}, b=-\frac{2}{5}$ (c) $a=-\frac{1}{10}, b=\frac{2}{5}$ (d) $a=\frac{1}{10}, b=\frac{2}{5}$

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33. If $\int\frac{3\sin x+2\cos x}{3\cos x+2\sin x}dx=ax+b\ln|2\sin x+3\cos x|+C,$ then (a) $a=-\frac{12}{13}, b=\frac{15}{39}$ (b) $a=-\frac{7}{13}, b=\frac{6}{13}$ (c)$a=\frac{12}{13}, b=\frac{15}{39}$ (d) $a=-\frac{7}{13}, b=-\frac{6}{13}$

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34. *If* $\int \frac{3e^x - 5e^{-x}}{4e^x + 5e^{-x}} dx = ax + b\ln\left(4e^x + 5e^{-x}\right) + C$, *then* (a) $a = -\frac{1}{8}, b = \frac{7}{8}$ (b) $a = \frac{1}{8}, b = \frac{7}{8}$ (c) $a = -\frac{1}{8}, b = -\frac{7}{8}$ (d) $a = \frac{1}{8}, b = -\frac{7}{8}$

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35. $\int \sqrt{\frac{\cos x - \cos^3 x}{1 - \cos^3 x}} dx$ is equal to (a) $-\frac{2}{3}\sin^{-1}\left(\cos^{\frac{3}{2}} x\right) + C$ (b) $\frac{3}{2}\sin^{-1}\left(\cos^{\frac{3}{2}} x\right) + C$ (c) $\frac{2}{3}\cos^{-1}\left(\cos^{\frac{3}{2}} x\right) + C$ (d) none of these

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36. If $l'(x)$ means $\log\log\log x$, the log being repeated r times, then $\int \left[x l(x) l^2(x) l^3(x) l'(x)\right]^{-1} ds$ is equal to $l^{r+1}(x) + C$ (b) $\frac{l^{r+1}(x)}{r+1} + C$ $l^r(x) + C$ (d) none of these

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37. $\int \frac{\cos 4x - 1}{\cot x - \tan x} dx$ is equal to

(A) $\frac{1}{2}\ln|\sec 2x| - \frac{1}{4}\cos^2 2x + c$

(B) $\frac{1}{2}\ln|\sec 2x| + \frac{1}{4}\cos^2 x + c$

(C) $\frac{1}{2}\ln|\cos 2x| - \frac{1}{4}\cos^2 2x + c$

(D) $\frac{1}{2}\ln|\cos 2x| + \frac{1}{4}\cos^2 x + c$

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38. If $\int \frac{dx}{\sqrt{\sin^3 x \cos^5 x}} = a\sqrt{\cot x} + b\sqrt{\tan^3 x} + c,$ then (a)$a = -1, b = \frac{1}{3}$ (b) $a = -3, b = \frac{2}{3}$ (c)$a = -2, b = \frac{4}{3}$ (d) none of these

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39. $\int e^{\tan^{-1}x}\left(1 + x + x^2\right) d\left(\cot^{-1}x\right)$ is equal to (a) $-e^{\tan^{-1}x} + c$ (b) $e^{\tan^{-1}x} + c$ (c) $-xe^{\tan^{-1}x} + c$ (d) $xe^{\tan^{-1}x} + c$

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40. $\int \frac{x^9 dx}{\left(4x^2+1\right)^6} isequal \rightarrow$

(a) $\frac{1}{5x}\left(4+\frac{1}{x^2}\right)^{-5}+c$

(b) $\frac{1}{5}\left(4+\frac{1}{x^2}\right)^{-5}+c$

(c) $\frac{1}{10}\left(1+4x^2\right)^{-5}+c$

(d) $\frac{1}{10}\left(4+\frac{1}{x^2}\right)^{-5}+c$

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41. $\int \frac{2\sin x}{3+\sin 2x} dx$ is equal to

A. (a) $\frac{1}{2}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right|-\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+c$

B. (b) $\frac{1}{2}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right|-\frac{1}{2\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+c$

C. (c) $\frac{1}{4}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right|-\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+c$

D. (d) None of these

Answer: null

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42. $\int\left(\frac{\ln(\tan x)}{\sin x\cos x}dx\right.$ i se q u a lto (a) $\frac{1}{2}\ln(\tan x)+c$ (b) $\frac{1}{2}\ln\left(\tan^2 x\right)+c$ (c) $\frac{1}{2}(\ln(\tan x))^2+c$ (d) none of these

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43. $\int\sin^{-1}\left(\frac{2x}{1+x^2}\right)dx$ is e q u a lto

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44. If $\int\frac{1-x^7}{x\left(1+x^7\right)}dx=a\log_e|x|+b\log_e\left|x^7+1\right|+c,$ then

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45. if $\int \frac{dx}{x^2\left(x^n+1\right)\left(\frac{n-1}{n}\right)} = -[f(x)]^{\frac{1}{n}} + c, then f(x) is$ $\left(1+x^n\right)$ (b) $1+x^{-1}$ $x^n + x^{-n}$ (d) none of these

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46. If $\int \frac{1}{x\sqrt{1-x^3}}dx = a\log\left|\frac{\sqrt{1-x^3}-1}{\sqrt{1-x^3}+1}\right| + b, then a is equal$ $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $-\frac{1}{3}$ (d0 $-\frac{2}{3}$

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47. Evaluate: $\int \frac{\sqrt{\cos 2x}}{\sin x}dx$

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48. Evaluate: $\int \left(\sqrt{\frac{1 + x^2}{x^2 - x^4}} \right) dx$

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49. Evaluate: $\int \frac{x^2}{(a + bx)^2} dx$

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50. Evaluate: $\int \sqrt{1 + \sin\left(\frac{x}{2}\right)} dx$

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51. Evaluate: $\int \frac{x^2}{\sqrt{1 - xdx}}$

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52. Evaluate: $\int\left(e^{\log x}+\sin x\right)\cos x dx$

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53.

If $f(x)=\sqrt{x}, g(x)=e^{x}-1,$ and $\int fog(x)dx=Afog(x)+B\tan^{-1}(fog(x))+C,$ then A

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54. If $\int\frac{2\cos x-\sin x+\lambda}{\cos x+\sin x-2}dx=A\ln|\cos x+\sin x-2|+Bx+C,$ then the value of $A+B+|\lambda|$ is_____

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55. If $\int\left[\left(\frac{x}{e}\right)^{x}+\left(\frac{e}{x}\right)^{x}\right]\ln x dx=A\left(\frac{x}{e}\right)^{x}+B\left(\frac{e}{x}\right)^{x}+C$ then the value of $A+B$ is____

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56. Evaluate: $\int \frac{\sin x}{\sin x - \cos x} dx$

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57. Evaluate: $\int \frac{(x-1)e^x}{(x+1)^3} dx$

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58. Evaluate: $\int \frac{dx}{x^2\left(x^4+1\right)^{\frac{3}{4}}}$

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59. $If \int x \log\left(1+\frac{1}{x}\right) dx = f(x)\log(x+1) + g(x)x^2 + Ax + C,$ then (a)$f(x) = \frac{1}{2}x^2$ (b) $g(x) = \log x$ (c)$A = 1$ (d) none of these

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60. $If I = \int \frac{dx}{x^3\sqrt{x^2 - 1}}, then I equals$ a. $\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x^3} + \tan^{-1}\sqrt{x^2 - 1}\right) + C$ b. $\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x^2} + x\tan^{-1}\sqrt{x^2 - 1}\right) + C$ c. $\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x} + \tan^{-1}\sqrt{x^2 - 1}\right) + C$ d. $\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x^2} + \tan^{-1}\sqrt{x^2 - 1}\right) + C$

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61. The value of $\int \frac{ax^2 - b}{x\sqrt{c^2x^2 - \left(ax^2 + b\right)^2}}$ (a) $\frac{1}{c}\sin^{-1}\left(ax + \frac{b}{x}\right) + k$ (b) $c\sin^{-1}\left(a + \frac{b}{x}\right) + e$ (c) $\sin^{-1}\left(\frac{ax + \frac{b}{x}}{c}\right) + k$ (d) none of these

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62. $If\int \frac{dx}{\cos^3 x\sqrt{\sin 2x}} = a\left(\tan^2 x + b\right)\sqrt{\tan x} + c, then$ (a) $a = \frac{\sqrt{2}}{5}, b = \frac{1}{\sqrt{5}}$ (b) $a = \frac{\sqrt{2}}{5}, b = 5$ (c)$a = \frac{\sqrt{2}}{5}, b = -\frac{1}{\sqrt{5}}$ (d) $a = \frac{\sqrt{2}}{5}, b = \sqrt{5}$

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63. $4\int \frac{\sqrt{a^6 + x^8}}{x} dxisequal \rightarrow$ (a)$\sqrt{a^6 + x^8} + \frac{a^3}{2}\ln\left|\frac{\sqrt{a^6 + x^8} + a^3}{\sqrt{a^6 + x^8} - a^3}\right| + c$ (b) $a^6\ln\left|\frac{\sqrt{a^6 + x^8} - a^3}{\sqrt{a^6 + x^8} + a^3}\right| + c$ (c)$\sqrt{a^6 + x^8} + \frac{a^3}{2}\ln\left|\frac{\sqrt{a^6 + x^8} - a^3}{\sqrt{a^6 + x^8} + a^3}\right| + c$ (d) $a^6\ln\left|\frac{\sqrt{a^6 + x^8} + a^3}{\sqrt{a^6 + x^8} - a^3}\right| + c$

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64. If $I = \int e^{-x}\log\left(e^x + 1\right)dx,$ then I equals

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65. $If I_{m,n} = \int \cos^m x \sin nx dx, then 7I_{4,3} - 4I_{3,2}$ is equal to (a) constant (b) $-\cos^2 x + C$ (c) $-\cos^4 x \cos 3x + C$ (d) $\cos 7x - \cos 4x + C$

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66. if $\int \frac{dx}{x^2\left(x^n + 1\right)^{\left(\frac{n-1}{n}\right)}} = -[f(x)]^{\frac{1}{n}} + c, then f(x) is$ (a) $\left(1 + x^n\right)$ (b) $1 + x^{-1}$ (c) $x^n + x^{-n}$ (d) none of these

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67. Evaluate: $\int \left(\sqrt{\tan x} + \sqrt{\cot x}\right) dx$

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68. Evaluate: $\int \frac{\sqrt{\cos 2x}}{\sin x} dx$

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69. $If \int xe^x \cos x dx = ae^x(b(1 - x)\sin x + cx\cos x) + d, then$ (a) $a = 1, b = 1, c = -1$ (b) $a = \frac{1}{2}, b = -, c = 1$ (c) $a = 1, b = -1, c = 1$ (d) $a = \frac{1}{2}, b = 1, c = -1$

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70. If $I = \int \sqrt{\frac{5 - x}{2 + x}} dx,$ then equal

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71. Evaluate: $\int \frac{x + 1}{x\left(1 + xe^x\right)^2} dx$

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72. Evaluate: $\int \cos 2\theta \ln\left(\frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}\right) d\theta$

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73. Evaluate: $\int \left(\frac{1}{x^3 + x^4} + \left(\frac{\ln\left(1 + x^{\frac{1}{6}}\right)}{x^{\frac{1}{3}} + \sqrt{x}} \right) \right) dx$

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74. Evaluate: $\int \left(\sqrt{\tan x} + \sqrt{\cot x} \right) dx$

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75. $If I = \int \frac{dx}{\left(a^2 - b^2x^2\right)^{\frac{3}{2}}}, then I equal$ (a) $\frac{x}{\sqrt{a^2 - b^2x^2}} + C$ (b) $\frac{x}{2\sqrt{a^2 - b^2x^2}} + C$ (c) $\frac{ax}{\sqrt{a^2 - b^2x^2}} + C$ (d) none of these

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76. If $I = \int \left(\sqrt{\cot x} - \sqrt{\tan x}\right) dx, then I equal$ $\sqrt{2}\log\left(\sqrt{\tan x} - \sqrt{\cot x}\right) + C$

$\sqrt{2}\log|\sin x|\cos x + \sqrt{\sin 2x}\ |\ + C$ $\sqrt{2}\log\left|s \in x - \cos x + \sqrt{2}s \in x\cos x\right| + C$

$\sqrt{2}\log\left|\sin\left(x + \frac{\pi}{4}\right) + \sqrt{2}\sin x\cos x\right| + C$

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77. $\int x\left(\left(\frac{\ln a^{\frac{x}{2}}}{3a^{\frac{5x}{2}}b^{3x}} + \frac{\ln b^{b} \wedge x}{2a^{2x}b^{4x}}\right)dx\left(where a, b \in R^{+}\right) is equa < o\right.$

$\frac{1}{6\ln a^2 b^3} a^{2x} b^{3x} \frac{\ln\left(a^{2x}b^{3x}\right)}{e} + k$ $\frac{1}{6\ln a^2 b^3} \frac{1}{a^{2x}b^{3x}} \frac{\ln 1}{ea^{2x}b^{3x}} + k$

$\frac{1}{6\ln a^2 b^3} \frac{1}{a^{2x}b^{3x}} \ln\left(a^{2x}b^{3x}\right) + k - \frac{1}{6\ln a^2 b^3} \frac{1}{a^{2x}b^{3x}} \ln\left(a^{2x}b^{3x}\right) + k$

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78. $\left(\int e^{x} \wedge 4(x+x^3+2x^5)e^{x} \wedge 2dx\right) is equa < o$ 1/2x e^x^2e^x^4+c(b)

1/2x^2e^x^4+c1/2e^x^2e^x^4+c(d)1/2x^2e^x^2e^x^4+c`

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79. $\int \frac{\operatorname{cosec}^2 x - 2005}{\cos^{2005} x} dx$ is equal to (a) $-\frac{\cot x}{(\cos x)^{2005}} + c$ (b) $\frac{\tan x}{(\cos x)^{2005}} + c$ (c) $-\frac{\tan x}{(\cos x)^{2005} + c}$ (d) none of these

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80. If $\int \frac{x \ln\left(x + \sqrt{1 + x^2}\right)}{\sqrt{1 + x^2}} dx = a\sqrt{1 + x^2} \ln\left(x + \sqrt{1 + x^2}\right) + bx + c$, then (A) $a = 1, b = -1$ (B) $a = 1, b = 1$ (C) $a = -1, b = 1$ (D) $a = -1, b = -1$

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81. If $\int f(x) \sin x \cos x dx = \frac{1}{2\left(b^2 - a^2\right)} \ln f(x) + c$,then f(x) is equal to

A. (a) $\frac{1}{a^2 \sin^2 x + b^2 \cos^2 x}$

B. (b) $\frac{1}{a^2 \sin^2 x - b^2 \cos^2 x}$

C. (c) $\frac{1}{a^2 \cos^2 x + b^2 \cos^2 x}$

D. (d) $\frac{1}{a^2\cos^2 x - b^2\cos^2 x}$

Answer: null

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82. $If x f(x) = 3f^2(x) + 2, then \int \frac{2x^2 - 12xf(x) + f(x)}{(6f(x) - x)\left(x^2 - f(x)\right)^2} dx$ equal. (A) $\frac{1}{x^2 - f(x)} + c$ (B) $\frac{1}{x^2 + f(x)} + c$ (C) $\frac{1}{x - f(x)} + c$ (D) $\frac{1}{x + f(x)} + c$

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83. $\int \frac{dx}{\left(1 + \sqrt{x}\right)\sqrt{\left(x - x^2\right)}}$ is equal to (a) $\frac{1 + \sqrt{x}}{(1 - x)^2} + c$ (b) $\frac{1 + \sqrt{x}}{(1 + x)^2} + c$ (c) $\frac{1 - \sqrt{x}}{(1 - x)^2} + c$ (d) $\frac{2\left(\sqrt{x} - 1\right)}{\sqrt{(1 - x)}} + c$

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84. The value of integral $\int e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{1-2x^2}{\sqrt{\left(1+x^2\right)^5}}\right)dx$ is equal to

$(a)e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{x}{\sqrt{\left(1+x^2\right)^3}}\right)+c$ $(b)e^x\left(\frac{1}{\sqrt{1+x^2}}-\frac{x}{\sqrt{\left(1+x^2\right)^3}}\right)+c$

$(c)e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{x}{\sqrt{\left(1+x^2\right)^5}}\right)+c$ (d)none of these

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85. $\int\sqrt{1+\operatorname{cosec}x}$ dx equals

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86. If $I=\int\sec^2x\operatorname{cosec}^4x dx=A\cot^3x+B\tan x+C\cot x+D,$ then find the values of A,B,C and D.

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87. A curve $g(x) = \int x^{27}\left(1 + x + x^2\right)^6\left(6x^2 + 5x + 4\right)dx$ is passing through origin. Then (a)$g(1) = \frac{3^7}{7}$ (b) $g(1) = \frac{2^7}{7}$ (c)$g(-1) = \frac{1}{7}$ (d)$g(-1) = \frac{3^7}{14}$

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88. If $\int \sqrt{\operatorname{cosec} x + 1}dx = kfog(x) + c, where k$ is a real constant, then (a). $k = -2, f(x) = \cot^{-1}x, g(x) = \sqrt{\operatorname{cosec} x - 1}$ (b) $k = -2, f(x) = \tan^{-1}x, g(x) = \sqrt{\operatorname{cosec} x - 1}$ (c) $k = 2, f(x) = \tan^{-1}xg(x) = \frac{\cot x}{\sqrt{\operatorname{cosec} x - 1}}$ (d) $k = 2, f(x) = \cot^{-1}xg(x) = \frac{\cot x}{\sqrt{\operatorname{cosec} x - 1}}$

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89. $\int \frac{x^4 - 1}{x^2\sqrt{x^4 + x^2 + 1}}dx =$ (a) $\sqrt{x^2 + \frac{1}{x^2} + 1} + C$ (b) $\frac{\sqrt{x^4 + x^2 + 1}}{x^2} + C$ (c) $\frac{\sqrt{x^4 + x^2 + 1}}{x} + C$ (d) none of these

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90. $\int \frac{x^2 - 1}{x^3\sqrt{2x^4 - 2x^2 + 1}} dx$ is equal to (a) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x^3} + C$ (b) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x} + C$ (c) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x^2} + C$ (d) $\frac{\sqrt{2x^4 - 2x^2 + 1}}{2x^2} + C$

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91. $\int \sqrt{e^x - 1} dx isequa < o$ $2\left[\sqrt{e^x - 1} - \tan^{-1}\sqrt{e^x - 1}\right] + c$ $\sqrt{e^x - 1} - \tan^{-1}\sqrt{e^x - 1} + c$ $\sqrt{e^x - 1} + \tan^{-1}\sqrt{e^x - 1} + c$ $2\left[\sqrt{e^x - 1} - \tan^{-1}\sqrt{e^x - 1}\right] + c$

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92. If $\int \sin x d(\sec x) = f(x) - g(x) + c, then\ f(x) = \sec x$ (b) $f(x) = \tan x\ g(x) = 2x$ (d) $g(x) = x$

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93. If $I = \int \frac{\sin x + \sin^3 x}{\cos 2x} dx = P\cos x + Q\log|f(x)| + R,$ then (a) $P = \frac{1}{2}, Q = -\frac{3}{4\sqrt{2}}$ (b) $P = \frac{1}{4}, Q = \frac{1}{\sqrt{2}}$ (c)$f(x) = \frac{\sqrt{2}\cos x + 1}{\sqrt{2}\cos x - 1}$ (d) $f(x) = \frac{\sqrt{2}\cos x - 1}{\sqrt{2}\cos x + 1}$

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94. If $\int \frac{e^{x-1}}{\left(x^2 - 5x + 4\right)} 2x dx = AF(x-1) + BF(x-4) + C$ and $F(x) = \int \frac{e^x}{x} dx$, *then*

A. (a)$A = -\frac{2}{3}$

B. (b) $B = \left(\frac{4}{3}\right)e^3$

C. (c)$A = \frac{2}{3}$

D. (b) $A = \left(\frac{4}{3}\right)e^3$

Answer: null

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95. Evaluate: $\int \frac{1}{x}\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}dx$

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96. Evaluate: $\int \frac{x^3+3x+2}{\left(x^2+1\right)^2(x+1)}dx$

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97. $\int \frac{3+2\cos x}{(2+3\cos x)^2}dx$ is equal to (a) $\left(\frac{\sin x}{3\cos x+2}\right)+c$ (b) $\left(\frac{2\cos x}{3\sin x+2}\right)+c$ (c) $\left(\frac{2\cos x}{3\cos x+2}\right)+c$ (d) $\left(\frac{2\sin x}{3\sin x+2}\right)+c$

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98. $\int \left(\frac{x+2}{x+4}\right)^2 e^x dx$ is equal to

A. (a) $e^x\left(\frac{x}{x+4}\right)+c$

B. (b) $e^x\left(\frac{x+2}{x+4}\right)+c$

C. (c) $e^x\left(\frac{x-2}{x+4}\right)+c$

D. (d) $\left(\frac{2xe^2}{x+4}\right)+c$

Answer: null

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99. $IfI = \int \frac{\sin 2x}{(3+4\cos x)^3} dx, thenIequals$ (a) $\frac{3\cos x+8}{(3+4\cos x)^2}+C$ (b) $\frac{3+8\cos x}{16(3+4\cos x)^2}+C$ (c) $\frac{3\cos x}{(3+4\cos x)^2}+C$ (d) $\frac{3-8\cos x}{16(3+4\cos x)^2}+C$

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100. If $I = \int \frac{dx}{\sec x + \operatorname{cosec} x}$, then equals

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101. $\int \frac{x^3 dx}{\sqrt{1 + x^2}}$ is equal to (A) $\frac{1}{3}\sqrt{1 + x^2}\left(2 + x^2\right) + C$ (B) $\frac{1}{3}\sqrt{1 + x^2}\left(x^2 - 1\right) + C$ (C) $\frac{1}{3}\left(1 + x^2\right)^{\frac{3}{2}} + C$ (D) $\frac{1}{3}\sqrt{1 + x^2}\left(x^2 - 2\right) + C$

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102. $\int e^{\tan x}(\sec x - \sin x)dx$ is equal to

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103. $\int e^x \frac{\left(x^2 + 1\right)}{(x + 1)^2} dx is equal \rightarrow$ $\left(\frac{x - 1}{x + 1}\right)e^x + c$ (b) $e^x\left(\frac{x + 1}{x - 1}\right) + c$ $e^x(x + 1)(x - 1) + c$ (d) none of these

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104. $\int x\sin x\sec^3 x dx$ is equal to

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105. $If I = \int \frac{dx}{x^3\sqrt{x^2 - 1}}, then I equals$ $\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x^3} + \tan^{-1}\sqrt{x^2 - 1}\right) + C$

$\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x^2} + x\tan^{-1}\sqrt{x^2 - 1}\right) + C$ $\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x} + \tan^{-1}\sqrt{x^2 - 1}\right) + C$

$\frac{1}{2}\left(\frac{\sqrt{x^2 - 1}}{x^2} + \tan^{-1}\sqrt{x^2 - 1}\right) + C$

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106. $\int \frac{\ln\left(\frac{x-1}{x+1}\right)}{x^2 - 1} dx$ *is equal* to (a) $\frac{1}{2}\left(\ln\left(\frac{x - 1}{x + 1}\right)\right)^2 + C$ (b) $\frac{1}{2}\left(\ln\left(\frac{x + 1}{x - 1}\right)\right)^2 + C$

(c) $\frac{1}{4}\left(\ln\left(\frac{x - 1}{x + 1}\right)\right)^2 + C$ (d) $\frac{1}{4}\left(\ln\left(\frac{x + 1}{x - 1}\right)\right)^2 + C$

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107. Let $g(x) = \int \frac{1 + 2\cos x}{(\cos x + 2)^2} dx and g(0) = 0.$ then the value of $8g\left(\frac{\pi}{2}\right)$ is

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108.

Let $k(x) = \int \frac{\left(x^2 + 1\right)dx}{\sqrt[3]{x^3 + 3x + 6}}$ and $k(-1) = \frac{1}{\sqrt[3]{2}}$. Then the value of $k(-2)$ is $-$.

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109. Column I a) $\int \frac{x^2 - x + 1}{x^3 - 4x^2 + 4x} dx$ b) $\int \frac{x^2 - 1}{x(x-2)^3} dx$ c) $\int \frac{x^3 + 1}{x(x-2)^2} dx$ d) $\int \frac{x^5 + 1}{x(x-2)^3} dx$ COLUMN II (which of the following functions appear in integration of functions in columnI) p) $\log|x|$ q) $\log|x - 2|$ r.) $\frac{1}{(x-2)}$ s) x

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110. Let $f(x) = \int x^{\sin x}\left(1 + x\cos x \ln x + \sin x\right)dx \text{ and } f\left(\frac{\pi}{2}\right) = \frac{\pi^2}{4}$. Then the value of $|\cos(f(\pi))|$ is____

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111. Each question contains statements given in two columns which have to be matched. Statements (a,b,c,d) in column I have to be matched with statements (p,q,r,s) in column II. If the correct match are a-p, s, b-r c-p, q. and d-s, then the correctly bubbled $4x4$ matrix should be as follows: figure Column I, a) If $\int \frac{2^x}{\sqrt{1 - 4^x}}dx = k\sin^{-1}(f(x)) + C$, then $k$is greater than, b) If $\int \frac{\left(\sqrt{x}\right)^5}{\left(\sqrt{x}\right)^7 + x^6}dx = a\frac{\ln\left(x^k\right)}{x^k + 1} + c$, then $ak$is less than, c) If $\int \frac{x^4 + 1}{x\left(x^2 + 1\right)^2}dx = k\ln|x| + \frac{m}{1 + x^2} + n$, where $n$is the constant of integration, then $mk$is greater than, d) If

$\int \frac{dx}{5+4\cos x} = k\tan^{-1}\left(m\tan\frac{x}{2}\right) + C,$ then k/m is greater than, COLUMN II p) 0 q) 1 r) 3 s) 4

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112. The value of $\int e^2 x\left(\frac{1}{x} - \frac{1}{2x^2}\right)dx$ is

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113. Statement 1: If the primitive of $f(x) = \pi\sin\pi x + 2x - 4$ has the value 3 for $x = 1$, then there are exactly two values of x for which primitive of $f(x)$ vanishes. Statement 2: $\cos\pi x$ has period 2.

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114. Let f(x)=$2^{2x-1}$and ϕ(x) =$-2^x + 2x\log 2$. If f'(x)>ϕ'(x), then value of x is-

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115. Evaluate: $\int \frac{\sin^{-1}\sqrt{x} - \cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x}} dx$

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116. If $\int x^2 e^{-2x} dx = e^{-2x}\left(ax^2 + bx + c\right) + d,$ then the value of $\left|\frac{a}{bc}\right|$ is_____

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117. If $f(x) = \int \frac{3x^2 + 1}{\left(x^2 - 1\right)^3} dx and f(0) = 0,$ then the value of $\left|\frac{2}{f(2)}\right|$ is___

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118. Evaluate: $\int \sqrt{\frac{1 - \sqrt{x}}{1 + \sqrt{x}}} dx$

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119. If $\int x^5\left(1+x^3\right)^{2/3}dx = A\left(1+x^3\right)^{8/3} + B\left(1+x^3\right)^{5/3} + c,$ then

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120. The value of the integral $\int \frac{(1-\cos\theta)^{\frac{2}{7}}}{(1+\cos\theta)^{\frac{9}{7}}}d\theta$ is

A. (a) $\frac{7}{11}\left(tan\frac{\theta}{2}\right)^{\frac{11}{7}} + C$ (b) $\frac{7}{11}\left(\frac{\cos\theta}{2}\right)^{\frac{11}{7}} + C$ (c) $\frac{7}{11}\left(s\int h\frac{\eta}{2}\right)^{\frac{11}{7}} + C$ (d) none of these

B. null

C. null

D. null

Answer: null

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121. Let $f(x) = \int \frac{x^2 dx}{\left(1 + x^2\right)\left(1 + \sqrt{x^2 + 1}\right)} and f(0) = 0.$ Then value of $f(1)$ will be

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122. If $y = \int \sqrt{x}\left(1 + x^{\frac{1}{3}}\right)^4 dx$i se q u a lto

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123. If $\int \sqrt{1 + \sin x} f(x) dx = \frac{2}{3}(1 + \sin x)^{\frac{3}{2}} + c, then f(x) equal$ $\cos x$ (b) $\sin x$ (c) $\tan x$ (d) 1

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124. Let $\int e^x \left\{f(x) - f'(x)\right\} dx = \varphi(x)$ Then $\int e^x f(x) dx$ is

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125. Evaluate: $\int \frac{\sin 2x}{\sin^4 + \cos^4 x} dx$

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126. $\int \frac{\sec x}{\sqrt{\cos 2x}} dx$ is equal to

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127. Evaluate : $\int \frac{x^2 + 20}{(x\sin x + 5\cos x)^2} dx$

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128. $\int \frac{x + 2}{\left(x^2 + 3x + 3\right)\left(\sqrt{x + 1}\right)} . dx$

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129. Evaluate: $\int \frac{1}{\left(x^2\right)\sqrt{1 - x^2}} dx$

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130. Evaluate: $\int x \cdot \sqrt{1 - x^4} dx$

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131. Evaluate: $\int \frac{1}{(x - 3)\sqrt{x + 1dx}}$

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132. Evaluate: $\int (x - 5)\sqrt{x^2 + xdx}$

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133. Evaluate: $\int \frac{x+1}{(x-1)\sqrt{x+2}} dx$

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134. Evaluate: $\int \sec^3 x dx$

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135. Evaluate: $\int \frac{x^2-1}{\left(x^2+1\right)\sqrt{x^4+1}} dx$

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136. Evaluate: $\int \frac{1}{(x+1)\sqrt{x^2-1}} dx$

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137. Evaluate: $\int \frac{1}{\left(x^2 - 4\right)\sqrt{x + 1}} dx$

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138. Evaluate: $\int \frac{1}{(x + 1)\sqrt{x^2 + x + 1}} dx$

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139. Evaluate: $\int \frac{x}{\left(x^2 + 4\right)\sqrt{x^2 + 1}} dx$

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140. Evaluate: $\int \frac{x}{(x - 1)\left(x^2 + 4\right)} dx$

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141. Evaluate: $\int e^{\sin^{-1}x} dx$

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142. Evaluate: $\int \frac{x^2 + 1}{(x - 1)^2 (x + 3)} dx$

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143. $\int \sin^3 x \cos^5 x$ dx

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144. Find: $\int \frac{dx}{\sin x \cos^3 x}$

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145. Find $\int \frac{e^x(1+x)}{\cos^2\left(xe^x\right)}dx$

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146. Evaluate: $\int \frac{\sin^3 x dx}{\left(\cos^4 x + 3\cos^2 x + 1\right)\tan^{-1}(\sec x + \cos x)}$

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147. Evaluate: $\int \frac{e^{\sqrt{x}}\cos\left(e^{\sqrt{x}}\right)}{\sqrt{x}}dx$

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148. Evaluate: $\int \frac{\tan x}{a + b\tan^2 x}dx$

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149. Evaluate: $\int \frac{1}{\left(\sqrt{e^{5x}}\left(e^{2x}+e^{-2x}\right)^{3}\right)^{\frac{1}{4}}}$

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150. Find: $\int \sin^{5} x dx$

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151. Evaluate: $\int \frac{1}{\left(x^{2}+2x+2\right)} dx$

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152. Evaluate: $\int \left(\left(\frac{e}{x}\right)^{x}+\left(\frac{x}{e}\right)^{x}\right) \ln x \, dx.$

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153. Evaluate: $\int \frac{x}{x^4 + x^2 + 1} dx$

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154. Evaluate: $\int \frac{x^2 - 1}{\left(x^4 + 3x^2 + 1\right)\tan^{-1}\left(x + \frac{1}{x}\right)} dx$

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155. Evaluate: $\int \frac{x^2 - 1}{\left(x^2 + 1\right)\sqrt{1 + x^4}}$

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156. Evaluate: $\int \frac{1}{2x^2 + x - 1} dx$

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157. Evaluate: $\int \frac{x^2 + 4}{x^4 + 16} dx$

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158. Evaluate: $\int \sqrt{\tan\theta} d\theta$

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159. Evaluate: $\int \frac{3\sin x + 2\cos x}{3\cos x + 2\sin x} dx$

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160. Evaluate: $\int \frac{x^2 + 1}{x^4 + 1} dx$

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161. Evaluate: $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$.

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162. Evaluate: $\int \frac{1}{x^4 + 1} dx$

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163. Evaluate: $\int \frac{1}{\sin^4 x + \cos^4 x} dx$

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164. Evaluate: $\int [f(x)g''(x) - f''(x)g(x)] dx$

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165. Evaluate: $\int \left(\log(\log x) + \frac{1}{(\log x)^2} \right) dx$

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166. Evaluate: $\int x^3 d\left(\tan^{-1} x\right)$

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167. Evaluate: $\int \sin^2(\log x) dx$

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168. Evaluate: $\int \left(\frac{\cos x}{x} - \log x^{\sin x} \right) dx$.

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169. Evaluate: $\int \frac{dx}{x^2\left(1+x^5\right)^{\frac{4}{5}}}$

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170. Evaluate: $\int \frac{1+x^4}{\left(1-x^4\right)^{\frac{3}{2}}} dx$

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171. Evaluate: $\int \frac{dx}{\sqrt[3]{\sin^{11}x\cos x}}$

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172. Evaluate: $\int \frac{\cos 2x}{2+\sin 2x} dx$

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173. Evaluate $\int \frac{\log_e\left(x + \sqrt{x^2 + 1}\right)}{\sqrt{x^2 + 1}} dx.$

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174. Evaluate: $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$

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175. Evaluate: $\int \frac{\left(x - x^3\right)^{\frac{1}{3}}}{x^4} dx$

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176. Evaluate: $\int \frac{1}{\left[(x - 1)^3 (x + 2)^5\right]^{\frac{1}{4}}} dx$

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177. Evaluate: $\int \frac{x^3 + 1}{x^2 + x} dx$

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178. Evaluate: Evaluate: $\int x^{-11} \left(1 + x^4\right)^{-\frac{1}{2}} dx$

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179. Evaluate: $\int \frac{2x - \sqrt{\sin^{-1} x}}{\sqrt{1 - x^2}} dx$.

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180. Evaluate: $\int \frac{e^{2x} - 1}{e^{2x} + 1} dx$.

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181. Evaluate: $\int \frac{\sin x}{\sin(x - a)} dx$

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182. Evaluate: $\int \frac{dx}{\cos x - \sin x}$

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183. Evaluate: $\int \sin\left(e^x\right) d\left(e^x\right)$

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184. Evaluate: $\int \tan^3 x dx$

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185. Evaluate : $\int \frac{\sin 2x}{a^2 + b^2 \sin^2 x} dx$

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186. Evaluate: $\int \cos^3 x \sqrt{\sin x} dx$

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187. Evaluate: $\int \frac{dx}{x^{\frac{1}{2}} + x^{\frac{1}{3}}}$

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188. Evaluate: $\int \left(2^{2^{2^x}} \left(2^{2^x}\right)\left(2^x\right)\right) dx$

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189. Evaluate: $\int \frac{e^x}{e^{2x} + 6e^x + 5} dx$

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190. The number of irrational roots of the equation $\frac{4x}{x^2 + x + 3} + \frac{5x}{x^2 - 5x + 3} = -\frac{3}{2}$ is

A. $a.\ 4$

B. $b.\ 0$

C. $c.\ 1$

D. $d.\ 2$

Answer: null

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191. Evaluate: $\int \sqrt{\frac{1 + x}{x}} dx$.

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192. Evaluate: $\int \frac{4x+1}{x^2+3x+2} dx$

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193. Evaluate: $\int \frac{dx}{\left(a^2+x^2\right)^{\frac{3}{2}}}$

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194. Evaluate: $\int \frac{1}{x^2\sqrt{1+x^2}} dx$

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195. Evaluate: $\int \frac{\sec^2 x}{\sqrt{\tan^2 x+4}} dx$

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196. Evaluate: $\int \frac{1}{\sqrt{(x-1)(x-2)}} dx$

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197. Evaluate: $\int \sqrt{\frac{x}{a^3 - x^3}} dx$

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198. Evaluate: $\int \frac{x^2}{\sqrt{1 - x^6}} dx$

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199. Evaluate: $\int \frac{\left[\sqrt{1 + x^2} + x\right]^n}{\sqrt{1 + x^2}} dx$

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200. Evaluate: $\int \frac{dx}{(x-p)\sqrt{(x-p)(x-q)}}$

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201. Evaluate: $\int \sec^5 x \operatorname{cosec}^3 x dx$

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202. Evaluate: $\int \frac{dx}{\cos^3 x \sqrt{\sin 2x}}$

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203. $\int \left(\left(x^4 - x \right)^{\frac{1}{4}} \right) \frac{dx}{x^5}$

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204. $\int \frac{1}{x^2\left(x^4+1\right)^{\frac{3}{4}}} dx$

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205. Evaluate: $\int x^x 1n(ex)dx$

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206. Evaluate: $\int \frac{x+1}{(x-1)\sqrt{x+2}} dx$

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207. Evaluate: $\int \{1+2\tan x(\tan x+\sec x))^{\frac{1}{2}} dx$

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208. Evaluate: $\int \frac{dx}{(1+\sin x)^{\frac{1}{2}}}$

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209. Find $\int \frac{\sin^6 x}{\cos^8 x} dx.$

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210. Evaluate: $\int \sin 2x d(\tan x)$

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211. Evaluate: $\int \frac{1}{\sqrt{3}\sin x + \cos x} dx$

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212. Evaluate: $\int \frac{1}{\sin(x - a)\sin(x - b)} dx$

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213. Evaluate: $\int \left(1 + 2x + 3x^2 + 4x^3 + \ldots\right) dx, (|x| < 1)$

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214. Evaluate: $\int \frac{\ln(\ln x)}{x \ln x} dx, (x > 0)$

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215. Evaluate: $\int \frac{dx}{x + x\log x}$

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216. Evaluate: $\int \sec^p x \tan x dx$

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217. Evaluate: $\int \operatorname{cosec}^4 x dx$

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218. Evaluate: $\int \frac{\cos x - \sin x}{\cos x + \sin x}(2 + 2\sin 2x)dx$

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219. Evaluate: $\int \tan^2 x \sin^2 x dx$

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220. Evaluate: $\int \frac{e^{3x} + e^{5x}}{e^x + e^{-x}} dx$

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221. Evaluate: $\int \frac{\cos 2x - \cos 2\theta}{\cos x - \cos\theta} dx$

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222. Evaluate: $\int \frac{(1 + 1nx)^5}{x} dx$

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223. Evaluate: $\int \sin x \cos x \cos 2x \cos 4x \cos 8x dx$

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224. Evaluate: $\int \frac{\sin 2x}{(a + b\cos x)^2} dx$

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225. Evaluate: $\frac{1}{\sqrt{1 - e^{2x}}} dx$

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226. Evaluate: $\int \frac{2x + 3}{\sqrt{x^2 + 4x + 1}} dx$

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227. Evaluate: $\int \frac{dx}{\sqrt{x} + \sqrt{x - 2}}$

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228. Evaluate: $\int \frac{x^3}{x + 1} dx$

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229. Evaluate: $\int x\sin 3x dx$

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230. Evaluate: $\int x\log x dx$

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231. Evaluate: $\int \sin^{-1} x dx$

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232. Evaluate: $\int \frac{x - \sin x}{1 - \cos x} dx$

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233. Evaluate: $\int \sqrt{x^2 + 2x + 5}\, dx$

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234. Evaluate: $\int \sqrt{1 + 3x - x^2} dx$

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235. Evaluate: $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$

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236. Evaluate: $\int \frac{\cot x}{\sqrt{\sin x}} dx$

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237. Evaluate: $\int \frac{\left(\sin^{-1}x\right)^3}{\sqrt{1-x^2}}dx$

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238. Evaluate: $\int \left(\frac{x+1}{x}\right)(x+\log x)^2 dx$

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239. Evaluate: $\int \tan^4 x dx$

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240. Evaluate: $\int (\tan x - x)\tan^2 x dx$

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241. Evaluate: $\int \frac{\log\left(\tan\left(\frac{x}{2}\right)\right)}{\sin x} dx$

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242. Evaluate: $\int \frac{\sqrt{2 + \log x}}{x} dx$

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243. Evaluate: $\int \frac{\log x}{(1 + \log x)^2} dx$

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244. $\int [\sin(\log x) + \cos(\log x)] dx$

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245. Evaluate: $\int e^x \left(\frac{1 - \sin x}{1 - \cos x} \right) dx$

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246. Evaluate: $\int \frac{e^x x}{(x+1)^2} dx$

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247. If $f(x)$ is polynomaial function of degree n, prove that $\int e^x f(x) dx = e^x \left[f(x) - f'(x) + f''(x) - f'''(x) + \ldots\ldots + (-1)^n f^n(x) \right]$ where $f^n(x) = \frac{d^n f}{dx^n}$

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248. Evaluate: $\int e^x \left(f(x) + f'(x) \right) dx = e^x f(x) + C$

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249. Evaluate: $\int \frac{dx}{x^2\left(x^4+1\right)^{\frac{3}{4}}}$ (A) $-\left(1+\frac{1}{x^4}\right)^{\frac{1}{4}}+c$ (B) $\left(1+\frac{1}{x^4}\right)^{\frac{1}{4}}+c$ (C) $-\left(1-\frac{1}{x^4}\right)^{\frac{1}{4}}+c$ (D) $-\left(1+\frac{1}{x^4}\right)^{\frac{1}{4}}+c$

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250. Evaluate: $\int \frac{dx}{\sqrt{2ax-x^2}}$

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251. Evaluate: $\int \sin^{-1}\sqrt{\frac{x}{a+x}}dx$.

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252. Evaluate: $\int \frac{x^{\frac{5}{2}}}{\sqrt{1+x^7}} dx$

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253. Evaluate: $\int \frac{\sec^2 x}{3+\tan x} dx$

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254. Evaluate: $\int \frac{x}{\sqrt{x+2}} dx$

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255. Evaluate: $\int \frac{1 - \tan x}{1+\tan x} dx$

Watch Video Solution

256. Evaluate: $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

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257. Evaluate: $\int \frac{1}{\sqrt{3x+4} - \sqrt{3x+1}} dx$.

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258. Evaluate: $\int \frac{dx}{(2x-7)\sqrt{(x-3)(x-4)}}$

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259. Evaluate: $\int \left(x + \frac{1}{x}\right)^{\frac{3}{2}} \left(\frac{x^2 - 1}{x^2}\right) dx$

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260. Find the values of a and b such that $\int \frac{dx}{1+\sin x} = \tan\left(\frac{x}{2}+a\right)+b$

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261. Evaluate: $\int \frac{\sin 2x}{a^2\sin^2 x + b^2\cos^2 x}dx$.

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262. Evaluate: $\int \frac{1}{1+e^{-x}}dx$.

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263. Evaluate: $\int \frac{e^x\left(2-x^2\right)dx}{(1-x)\sqrt{1-x^2}}$

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264. Evaluate: $\int e^x\left(1+\tan x+\tan^2 x\right)dx$

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265. If $\int g(x)dx = g(x)$, then evaluate $\int g(x)\left\{f(x)+f'(x)\right\}dx$

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266. Evaluate: $\int \cos\sqrt{x}dx$

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267. Evaluate: $\int x\sin^2 x dx$

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268. Evaluate: If $\int f(x)dx = g(x), then \int f^{-1}(x)dx$

Watch Video Solution

269. Evaluate: $\int \cos x \log\left(\tan\frac{x}{2}\right)dx$

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270. Evalaute: $\int \left(\frac{\log x - 1}{1 + (\log x)^2}\right)^2 dx$

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271. Evaluate: $\int \frac{x\sin^{-1}x}{\sqrt{1 - x^2}}dx$

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272. Evaluate: $\int \tan^{-1}\sqrt{x}dx$

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273. Evaluate $\int \sin^3 x dx$

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274. Evaluate $\int \sin 2x \sin 3x dx$

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275. Evaluate: $\int a^{mx} b^{nx} dx$

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276. Evaluate $\int \frac{\tan x}{\sec x + \tan x} dx$

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277. If $\int \frac{1}{x + x^5} dx = f(x) + c$,then the value of $\int \frac{x^4}{x + x^5} dx$.

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278. If $\int \frac{\left(x^3 + 8\right)(x - 1)}{x^2 - 2x + 4} dx$

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279. Integrate the functions $\frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x}$

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280. Evaluate: $\int \tan^{-1}(\sec x + \tan x) dx, -\frac{\pi}{2} < x < \frac{\pi}{2}$

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281. Evaluate: $\int \frac{x+2}{(x+1)^2} dx.$

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282. Evaluate $\int \left(\frac{8x+13}{\sqrt{4x+7}} \right) dx$

A. (A) $\frac{1}{3}(4x+7)^{\frac{3}{2}} - \frac{1}{2}(4x+7)^{\frac{1}{2}} + c$

B. (B) $\frac{1}{6}(4x+7)^{\frac{5}{2}} - \frac{2}{3}(4x+7)^{\frac{3}{2}} + c$

C. (C) $\frac{1}{3}(4x+7)^{\frac{5}{2}} - \frac{1}{2}(4x+7)^{\frac{3}{2}} + c$

D. (D) $(4x+7)^{\frac{3}{2}} - \frac{1}{2}(4x+7)^{\frac{1}{2}} + c$

Answer: null

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283. Evaluate: $\int \frac{\sec x dx}{\sqrt{\cos 2x}}$

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284. Evaluate: $\int \sin^3 x \cos^2 x dx$

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285. Evaluate: $\int \frac{xdx}{\sqrt{\left(1+x^2\right)}+\sqrt{\left(1+x^2\right)^3}}$

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286. Evaluate: $\int \frac{2x+1}{x^4+2x^3+x^2-1} dx$

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287. Evaluate: $\int \frac{1}{x^2-x+1} dx$

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288. Evaluate: $\int \frac{1}{2x^2 + x - 1} dx$

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289. Evaluate: $\int \frac{\cos x}{\sin\left(x - \frac{\pi}{6}\right)\sin\left(x + \frac{\pi}{6}\right)} dx$

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290. Evaluate: $\int \frac{\sin x}{\sin 3x} dx$.

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291. Evaluate: $\int \frac{1}{3 + \sin 2x} dx$

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292. Evaluate: $\int \frac{1}{1 + \sin x + \cos x} dx$

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293. Evaluate: $\int \frac{2x - 1}{(x - 1)(x + 2)(x - 3)} dx$

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294. Evaluate: $\int \tan^{-1} \sqrt{\frac{1 - x}{1 + x}} dx$

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295. Evaluate: $\int \frac{1}{\sin x - \sin 2x} dx$

Watch Video Solution

296. Evaluate: $\int \frac{2x}{\left(x^2+1\right)\left(x^2+2\right)} dx$

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297. Evaluate: $\int \frac{(x-1)(x-2)(x-3)}{(x-4)(x-5)(x-6)} dx$

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298. Evaluate: $\int \frac{1-\cos x}{\cos x(1+\cos x)} dx$

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299. Evaluate : $\int (1-\cos x)\operatorname{cosec}^2 x dx$

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300. Evaluate: $\int (\sec x + \tan x)^2 dx$

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301. Evaluate: $\int \frac{\sec x}{\sec x + \tan x} dx$.

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302. Evaluate: $\int \tan^{-1}\left\{\sqrt{\left(\frac{1 - \cos 2x}{1 + \cos 2x}\right)}\right\}$

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303. Evaluate: $\int \frac{1}{1 + \sin x} dx$

Watch Video Solution

304. Evaluate $\int \frac{1 - \cos x}{1 + \cos x} dx.$

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305. Evaluate: $\int \sec^2 x \operatorname{cosec}^2 x dx$

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306. Evaluate $\int \frac{2^{x+1} - 5^{x-1}}{10^x}$

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307. Evaluate: $\int \frac{(1 + x)^3}{\sqrt{x}} dx$

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308. Evaluate $\int \frac{\cos 2x \sin 4x dx}{\cos^4 x\left(1 + \cos^2 2x\right)}$

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309. Evaluate: $\int \frac{ax^3 + bx}{x^4 + c^2} dx$

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310. Evaluate $\int \frac{e^{2x} - 2e^x}{e^{2x} + 1} dx$

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311. Evaluate: $\int \frac{dx}{9 + 16\sin^2 x}$

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312. Find $\int \frac{dx}{\sqrt{x} + x}$

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313. Evaluate: $\int \frac{\cot x}{\sqrt{\sin x}} dx$

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314. Evaluate: $\int \frac{\sqrt{x} dx}{1 + x}$

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315. Evaluate: $\int \frac{x^2 \tan^{-1} x^3}{1 + x^6} dx$

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316. Evaluate: $\int \sin^2 x \cos^2 x dx$

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317. Evaluate: $\int \frac{1}{x^4 - 1} dx$

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318. If the product of n positive numbers is n^n. Then their sum is

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319. Evaluate: $\int \frac{dx}{\sin x \left(3 + \cos^2 x\right)}$

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320. Evaluate: $\int \frac{x^2 + 1}{x\left(x^2 - 1\right)} dx$

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321. Evaluate: $\int \frac{\sin x}{\sin 4x} dx$

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322. Evaluate $\int \frac{\log_{ex} e \cdot \log_{e^2 x} e \cdot \log_{e^3 x} e}{x} dx.$

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323. Evaluate: $\int e^{3\log x}\left(x^4 + 1\right)^{-1} dx$

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324. Evaluate: $\int \frac{dx}{x^{\frac{2}{3}}\left(1+x^{\frac{2}{3}}\right)}$

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325. $\lim_{x \to 0} \frac{1}{x}\left[\int_y^a e^{\sin^2 t} dt - \int_{x+y}^a e^{\sin^2 t} dt\right]$ is equal to

A. (a) $(0, 1]$

B. (b) $[1, \infty)$

C. (c) $(0, \infty)$

D. (d) none of these

Answer: null

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326. A function f is continuous for all x (and not everywhere zero) such that $f^2(x) = \int_0^x f(t)\frac{\cos t}{2+\sin t}dt$. Then $f(x)$ is (a) $\frac{1}{2}1n\left(\frac{x+\cos x}{2}\right); x \neq 0$ (b) $\frac{1}{2}1n\left(\frac{3}{x+\cos x}\right); x \neq 0$ (c) $\frac{1}{2}1n\left(\frac{2+\sin x}{2}\right); x \neq n\pi, n \in I$ (d) $\frac{\cos x + \sin x}{2+\sin x}; x \neq n\pi + \frac{3\pi}{4}, n \in I$

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327. If $\int_{\cos x}^{1}\left(t^2 f(t)dt = 1 - \cos x \forall x \in \left(0, \frac{\pi}{2}\right)\right.$, then the value of $\left[f\left(\frac{\sqrt{3}}{4}\right)\right]$ is

[.] denotes the greatest integer function) 4 (b) 5 (c) 6 (d) -7

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328. If $\int_0^y \cos t^2 dt = \int_0^{x^2}\frac{\sin t}{t}dx, the prove that \frac{dy}{dx} = \frac{2\sin x^2}{x\cos y^2}$

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329. $If\int_0^x f(t)dt = x + \int_x^1 tf(t)dt,$ then the value of $f(1)$

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330. Evaluate: $\lim x \to \infty \frac{\left(\int_0^x e^{x^2}dx\right)^2}{\int_0^x e^{2x^2}dx}$

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331. If $f(x) = 1 + \frac{1}{x}\int_1^x f(t)dt,$ then the value of $f\left(e^{-1}\right)$ is

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332. If $\int_0^1 e^{-x^2}dx = a,$ then find the value of $\int_0^1 x^2 e^{-x^2}dx$ in terms of a.

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333. $If\int_0^{f(x)} t^2 dt = x\cos\pi x, then f'(9) is$ - $\frac{1}{9}$ (b) - $\frac{1}{3}$ (c) $\frac{1}{3}$ (d) non-existent

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334. $If I_n = \int_0^{\pi} x^n \sin x dx$,t h e n fin d t h e v a l u eof $I_5 + 20I_3$

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335. The value of $\int_0^1 \lim_{n \to \infty} \sum_{k=0}^{n} \frac{x^{k+2} 2^k}{k!} dx$ is: (a) $e^2 - 1$ (b) 2 (c) $\frac{e^2 - 1}{2}$ (d) $\frac{e^2 - 1}{4}$

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336. If $I_n = \int_0^{\frac{\pi}{2}} \sin^n x dx$, then show that $I_n = ((n - 1)n)I_{n-2}$.

Hence prove that

$$I_n = \begin{cases} \left(\frac{n-1}{n}\right)\left(\frac{n-3}{n-2}\right)\left(\frac{n-5}{n-4}\right)\ldots\ldots\ldots\left(\frac{1}{2}\right)\frac{\pi}{2} & \text{if } n \text{ is even} \\ \left(\frac{n-1}{n}\right)\left(\frac{n-3}{n-2}\right)\left(\frac{n-5}{n-4}\right)\ldots\ldots\ldots\left(\frac{2}{3}\right)1 & \text{if } n \text{ is odd} \end{cases}$$

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337. If $A = \int_0^1 x^{50}(2-2x)^{50}dx$, $B = \int_0^1 x^{50}(1-x)^{50}dx$, which of the following is true? (A) $A = 2^{50}B$ (B) $A = 2^{-50}B$ (C) $A = 2^{100}B$ (D) $A = 2^{-100}B$

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338. If $I_n = \int_0^1 \frac{dx}{\left(1+x^2\right)^n}$; $n \in N$, then prove that $2nI_{n+1} = 2^{-n} + (2n-1)I_n$

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339. Given that f satisfies $|f(u) - f(v)| \leq |u - v|f$ or u and v in $[a, b]$ Then $\left|\int_a^b f(x)dx - (b-a)f(a)\right| \leq$ (a) $\frac{(b-a)}{2}$ (b) $\frac{(b-a)^2}{2}$ $(b-a)^2$ (d) none of these

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340. $IfI_n = \int_0^1 x^n \left(\tan^{-1}x\right)dx, thenprovethat\ (n+1)I_n + (n-1)I_{n-2} = -\frac{1}{n} + \frac{\pi}{2}$

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341. $IfI = \int_{-20\pi}^{20\pi} |\sin x|[\sin x]dx(where[.]$ denotes the greatest integer function), then the value of I is -40 (b) 40 (c) 20 (d) -20

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342. If $I_m = \int_1^x (\log x)^m dx$ satisfies the relation $\left(I_m\right) = k - lI_{m-1}then$

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343. The value of the integral $\int_0^1 \sqrt{\frac{1-x}{1+x}}dx$ i s (a)$\frac{\pi}{2} + 1$ (b) $\frac{\pi}{2} - 1$ (c)-1 (d) 1

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344. $IfI_{m,n} = \int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx,$ Then show that $I_{m,n} = \frac{m-1}{m+n} I_{m-2,n} (m, n \in N)$ Hence, prove that $I_{m,n} = f(x) = \left\{ \frac{(n-1)(n-3)(m-5)(n-1)(n-3)(n-5)}{(m+n)(m+n-2)(m+n-4)} \frac{\pi}{4} \right.$ when both m and n are even

$$\left. \frac{(m-1)(m-3)(m-5)(n-1)(n-3)(n-5)}{(m+n)(m+n-2)(m+n-4)} \right\}$$

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345. Evaluate: $\int_0^{\pi} \left(x \sin 2x \frac{\sin\left(\frac{\pi}{2}\cos x\right)}{2x - \pi} dx \right.$

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346. If $I_K = \int_1^e (\ln x)^k dx \left(k \in I^+\right) dx \left(k \in I^+\right)$, then find the value of I_4.

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347. If $\int_0^x \left\{ \int_0^u f(t)dt \right\} du$ is equal to (a) $\int_0^x (x - u)f(u)$ (b) $\int_0^x uf(x - u)du$ (c) $x\int_0^x f(u)du$ (d) $x\int_0^x uf(u - x)du$

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348. Prove that: $I_n = \int_0^\infty x^{2n+1} e^{-x^2} dx = \frac{n!}{2}, n \in N.$

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349. The value of the integral

$\int_{-1}^{3} \left(\tan^{1} \frac{x}{x^2 + 1} + \tan^{-1} \frac{x^2 + 1}{x} \right) dx$ is equal to

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350. It is known that $f(x)$ is an odd function in the interval $\left[-\frac{p}{2}, \frac{p}{2}\right]$ and has a period p, Prove that $\int_a^x f(t)dt$ is also periodic function with the same period.

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351. Evaluate: $\int_{-1}^{4} f(x)dx = 4 and \int_2^4 (3 - f(x))dx = 7$, then find the value of $\int_{-1}^{2} f(x)dx$.

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352. If $\int_0^{\frac{\pi}{2}} \log\sin\theta d(\theta) = k$, then find the value of $\int_0^{\frac{\pi}{2}} \left(\frac{\theta}{\sin\theta}\right)^2 d(\theta)$ in terms of k

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353. Evaluate: $\int_0^{\frac{\pi}{2}} |\sin x - \cos x| dx$

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354. Let $f(x)$ is continuous and positive for $x \in [a, b], g(x)$ is continuous for $x \in [a, b] and \int_a^b |g(x)| dx > \left| \int_a^b g(x) dx \right|$ STATEMENT 1 : The value of $\int_a^b f(x) g(x) dx$ can be zero. STATEMENT 2 : Equation $g(x) = 0$ has at least one root for $x \in (a, b)$

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355. Evaluate: $\int_{-5}^{5} x^2 \left[x + \frac{1}{2} \right] dx (where [.]$ denotes the greatest integer function).

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356. STATEMENT 1 : The value of $\int_{-4}^{-5}\sin\left(x^2 - 3\right)dx + \int_{-2}^{-1}\sin\left(x^2 + 12x + 33\right)$ is zero. STATEMENT 2 : $\int_{-a}^{a}f(x)dx = 0 \Leftrightarrow f(x)$ is an odd function.

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357. Evaluate: $\int_0^{2\pi}[\sin x]dx$,where[.] denotes the greatest integer function.

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358. STATEMENT 1 : The value of $\int_0^1\tan^{-1}\left(\frac{2x - 1}{1 + x - x^2}\right)dx = 0$ STATEMENT 2 : $\int_a^b f(x)dx = \int_0^b f(a + b - x)dx$ then Which of the following statement is correct ?

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359. Evaluate: $\int_0^{\infty}\left[2e^{-x}\right]dx, where[x]$ represents greatest integer function.

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360. STATEMENT 1 : On the interval $\left[\frac{5\pi}{4}, \frac{4\pi}{3}\right]$. the least value of the function $f(x) = \int_{\frac{5x}{4}}^{x}(3\sin t + 4\cos t)dtis0$ STATEMENT 2 : If $f(x)$ is a decreasing function on the interval $[a, b]$, then the least value of $f(x)$ is $f(b)$.

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361. Evaluate: $\int_0^{10\pi}\left[\tan^{-1}x\right]dx, where[x]$ represents greatest integer function.

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362. Consider the function $f(x)$ satisfying the relation $f(x+1) + f(x+7) = 0\,\forall x \in R$. STATEMENT 1 : The possible least value of t for which $\int_a^{a+t} f(x)dx$ is independent of $ais12$. STATEMENT 2 : $f(x)$ is a periodic function.

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363. Evaluate: $\int_0^{\frac{5\pi}{12}} [\tan x]dx$, where [.] denotes the greatest integer function.

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364. Consider $I_1 = \int_0^{\pi/4} e^{x^2} dx, I_2 = \int_0^{\pi/4} e^x dx, I_3 = \int_0^{\pi/4} e^{x^2} \cos x dx$, $I_4 = \int_0^{\pi/4} e^{x^2} \sin x dx.$

STATEMENT 1 : $I_2 > I_1 > I_3 > I_4$

STATEMENT 2 : For $x \in (0, 1), x > x^2 and \sin x > \cos x.$

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365. Evaluate: $\int_0^2 \left[x^2 - x + 1\right] dx, where[.]$ denotos the greatest integer function.

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366. $If f(x) = A\sin\left(\frac{\pi x}{2}\right) + b, f'\left(\frac{1}{2}\right) = \sqrt{2} and \int_0^1 f(x)dx = \frac{2A}{\pi}$ the constants A and B are (a) $\frac{\pi}{2} and \frac{\pi}{2}$ (b) $\frac{2}{\pi} and \frac{3}{\pi}$ (c) $0 and -\frac{4}{\pi}$ (d) $\frac{4}{\pi} and 0$

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367. If $[x]$ denotes the greatest integer less than or equal to x, then find the value of the integral $\int_0^2 x^2[x]dx$.

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368. The value of $\int_0^{2\pi}[2\sin x]dx, where [.]$ represents the greatest integral function, is (a) $\frac{-5\pi}{3}$ (b) $-\pi$ (c) $\frac{5\pi}{3}$ (d) -2π

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369. $f(x) = \int_1^x \frac{\tan^{-1}(t)}{t} dt \ \forall x \in R^+$, then find the value of $f\left(e^2\right) - f\left(\frac{1}{e^2}\right)$

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370. Let f be a positive function. Let $I_1 = \int_{1-k}^{k} xf([x(1-x)])dx$, $I_2 = \int_{1-k}^{k} f[x(1-x)]dx$, $where 2k - 1 > 0$. $Then \frac{I_1}{I_2} is$ 2 (b) k (c) $\frac{1}{2}$ (d) 1

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371. Find the points of minima for $f(x) = \int_0^x t(t-1)(t-2)dt$

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372. $If f(x) = e^{g(x)} and g(x) = \int_2^x \frac{tdt}{1+t^4}$, then find the value of $f'(2)$

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373. If $g(x) = \int_0^x \cos^4 tdt$, then $g(x+\pi)$ equals (a)$g(x) + g(\pi)$ (b) $g(x) - g(\pi)$ (c) $g(x)g(\pi)$ (d) $\frac{g(x)}{g(\pi)}$

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374. Evaluate $(\lim)_{x \to 4} \int_4^x \frac{(4t - f(t))}{(x - 4)} dt$

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375. The Integral $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{dx}{1 + \cos x}$ is equal to:

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376. If $I_n = \int_0^1 \left(1 - x^5\right)^n dx, then \frac{55}{7} \frac{I_{10}}{I_{11}}$ is equal to ___

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377. Let f be a one-to-one continuous function such that $f(2) = 3$ and $f(5) = 7$. Given $\int_2^5 f(x)dx = 17$, then find the value of $\int_3^7 f^{-1}(x)dx$.

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378. The integral $\int_{-\frac{1}{2}}^{\frac{1}{2}} \left([x] + 1n\left(\frac{1+x}{1-x}\right)\right)dx$ is equal to (where [.] represents the greatest integer function)

A. (a) $-\frac{1}{2}$

B. (b) 0

C. (c) 1

D. (d) $2\ln\left(\frac{1}{2}\right)$

Answer: null

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379. Evaluate: $\int_0^{e-1} \frac{e^{\frac{x^2+2x-1}{2}}}{x+1}dx + \int_1^e x\log x e^{\frac{x^2-2}{2}}dx$

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380. Evaluate: $\lim_{x \to 0} \frac{x - \left(\int_0^x \cos t^2 dt\right)}{x^3 - 6x}$

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381. The value of $2^{2010} \frac{\int_0^1 x^{1004}(1 - x)^{1004} dx}{\int_0^1 x^{1004}\left(1 - x^{2010}\right)^{1004} dx}$

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382. If $\int_0^1 \frac{e^t}{1 + t} dt = a$ then find the value of $\int_0^1 \frac{e^t}{(1 + t)^2} dt$ in terms of a.

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383. If $f(x) = x + \int_0^1 t(x + t)f(t)\text{dt}$,then the value of $\frac{23}{2} f(0)$ is equal to _____

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384. Let $f:(0,\infty)\overrightarrow{0,\infty}$ be a differentiable function satisfying, $\xi nt_0^x(1-t)f(t)dt=\int_0^x tf(t)dtx\in R^+ andf(1)=1.$ Determine $f(x)$

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385. If $f(x)andg(x)$ are continuous functions, then

$$\int_{1n\lambda}^{1n\frac{1}{\lambda}}\frac{f\left(\frac{x^2}{4}\right)[f(x)-f(-x)]}{g\left(\frac{x^2}{4}\right)[g(x)+g(-x)]}dxis$$ (a)dependent on λ (b) a none-zero constant

(c)zero (d) none of these

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386. The value of $\int_{-\pi}^{\pi}\frac{\cos^2 x}{1+a^x}dx$, a > 0 is

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387. If $\int_0^1 \frac{e^t dt}{t+1} = a$, then evaluate $\int_{b-1}^{b} \frac{e^t dt}{t-b-1}$

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388. If $f(x) = x + \sin x$, then find the value of $\int_{\pi}^{2\pi} f^{-1}(x)dx$.

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389. Let $F(x) = \int_x^{x^2+\frac{\pi}{6}} \left(2\cos^2 t\right)dt$ for all $x \in R$ and $f: \left[0, \frac{1}{2}\right] \to [0, \infty)$ be a continuous function.For $a \in \left[0, \frac{1}{2}\right]$, if F'(a)+2 is the area of the region bounded by x=0,y=0,y=f(x) and x=a, then f(0) is

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390. If $f(x)$ is a function satisfying $f\left(\frac{1}{x}\right) + x^2 f(x) = 0$ for all nonzero x, then evaluate $\int_{\sin\theta}^{\operatorname{cosec}\theta} f(x)dx$

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391.

$I_1 = \int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx, I_2 = \int_0^{2\pi} \cos^6 x dx, I_3 = \int_{\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^3 x dx, I_4 = \int_0^1 1n\left(\frac{1}{x} - 1\right) dx$ Ther

$I_2 = I_3 = I_4 = 0, I_1 \neq 0$ $I_1 = I_2 = I_3 = 0, I_4 \neq 0$ $I_1 = I_2 = I_3 = 0, I_4 \neq 0$

$I_1 = I_4 = I_3 = 0, I_2 \neq 0$

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392. The value of the integral $\int_{e^{-1}}^{e^2} \left| \frac{(\log)_e x}{x} \right| dx$ is (A) $\frac{3}{2}$ (B) $\frac{5}{2}$ (C) 3 (D) 5

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393. $If f(x) = \int_1^x \frac{\log t}{1 + t + t^2} dx \, \forall x \leq 1, then prove that f(x) = f\left(\frac{1}{x}\right)$

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394. If $f(x) = \int_0^{\pi} \frac{t\sin t dt}{\sqrt{1 + \tan^2 x \sin^2 t}}$ for $0 < x < \frac{\pi}{2}$, then (a) $f\left(0^+\right) = -\pi$ (b) $f\left(\frac{\pi}{4}\right) = \frac{\pi^2}{8}$ (c) f is continuous and differentiable in $\left(0, \frac{\pi}{2}\right)$ (d) f is continuous but not differentiable in $\left(0, \frac{\pi}{2}\right)$

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395. Evaluate: $\int_{\sqrt{2}-1}^{\sqrt{2}+1} \frac{\left(x^2 - 1\right)}{\left(x^2 + 1\right)^2} dx$

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396. $\int_0^x \frac{2^t}{2^{[t]}} dt$, $where[.]$ denotes the greatest integer function and $x \in R^+$, is equal to

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397. $If y = \int_0^x f(t)\sin\{k(x - t)\}dt, then prove that \frac{d^2y}{dx^2} + k^2y = kf(x)$.

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398. $f(x)$ is a continuous function for all real values of x and satisfies $\int_n^{n+1} f(x)dx = \frac{n^2}{2} \forall n \in I$. Then $\int_{-3}^{5} f(|x|)dx$ is equal to (a) $\frac{19}{2}$ (b) $\frac{35}{2}$ (c) $\frac{17}{2}$ (d) none of these

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399. If $x = \int_0^y \frac{dt}{\sqrt{1 + 9t^2}}$ and $\frac{d^2y}{dx^2} = ay$, then find a

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400. The value of $\int_{\frac{1}{e}}^{\tan x} \frac{tdt}{1 + t^2} + \int_{\frac{1}{e}}^{\cot x} \frac{dt}{t\left(1 + t^2\right)}$, where $x \in \left(\frac{\pi}{6}, \frac{\pi}{3}\right)$, is equal to: (a)0 (b) 2 (c) 1 (d) none of these

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401. Prove that: $y = \int_{\frac{1}{8}}^{\sin^2 x} \sin^{-1}\sqrt{t}dt + \int_{\frac{1}{8}}^{\cos^2 x} \cos^{-1}\sqrt{t}$, where $0 \le x \le \frac{\pi}{2}$, is the equation of a straight line parallel to the x-axis. Find the equation.

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402. $f(x) > 0 \forall x \in R$ and is bounded. If

$$\lim_{n \to \infty} \left[\int_0^a \frac{f(x)dx}{f(x) + f(a - x)} + a\int_a^{2a} \frac{f(x)dx}{f(x) + f(3a - x)} + a^2\int_{2a}^{3a} \frac{f(x)dx}{f(x) + f(5a - x)} + \ldots + a^{n-1}\int_{(n-1)a}^{na} \frac{f(x)dx}{f(x) + f[(2n - 1)a - x]}\right] = 7/5$$

(where $a < 1$), then a is equal to

A. (a) $\frac{2}{7}$

B. (b) $\frac{1}{7}$

C. (c) $\frac{14}{19}$

D. (d) $\frac{9}{14}$

Answer: null

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403. Evaluate: $\int_1^a xa^{\cdot - \left[(\log)_a x \right]} dx, (a > 1)$.

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404. $\int_0^\infty \frac{\sin^2 x}{x^2} dx$ must be same as:

A. (a) $\int_0^\infty \frac{\sin x}{x} dx$

B. (b) $\left(\int_0^\infty \frac{\sin x}{x} \right)^2$

C. (c) $\int_0^\infty \frac{\cos^2 x}{x^2}$

D. (d) none of these

Answer: null

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405. Evaluate: $\int_1^{e^6}\left[\frac{\log x}{3}\right]dx, where[.]$ denotes the greatest integer function.

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406. If $\int_0^\infty \frac{\sin x}{x}dx = \frac{\pi}{2}$, then $\int_0^\infty \frac{\sin^3 x}{x}dx$ is equal to

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407. Find the value of $\int_{-1}^{1}\left[x^2 + \{x\}\right]dx$, where [.] and $\{.\}$ denote the greatest function and fractional parts of x, respectiely.

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408. $\int_0^x [\cos t]dt, where x \in \left(2n\pi, 2n\pi + \frac{\pi}{2}\right), n \in N, and [.]$ denotes the greatest integer function . then the value of $f\left(\frac{1}{\pi}\right) is$

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409. Evaluate: $\int_{-\frac{\pi}{2}}^{2\pi} \left[\cot^{-1} x\right] dx$, where [.] denotes the greatest integer function

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410. Evaluate: $\int_{-\frac{\pi}{2}}^{2\pi} \left[\cot^{-1} x\right] dx$, where [.] denotes the greatest integer function

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411. $f(x)$ is continuous function for all real values of x and satisfies $\int_0^x f(t)dt = \int_x^1 t^2 f(t)dt + \frac{x^{16}}{8} + \frac{x^6}{3} + a$. Then the value of a is equal to: (a)- $\frac{1}{24}$ (b) $\frac{17}{168}$ (c) $\frac{1}{7}$ (d) - $\frac{167}{840}$

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412. Prove that $\int_0^1 xe^x dx$=1

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413. $I_1 = \int_0^{\frac{\pi}{2}} \ln(\sin x)dx, I_2 = \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \ln(\sin x + \cos x)dx$. Then (a)$I_1 = 2I_2$ (b) $I_2 = 2I_1$ $I_1 = 4I_2$ (d) $I_2 = 4I_1$

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414. Prove that $\int_0^{\infty}\left[ne^{-x}\right]dx = \ln\left(\frac{n^n}{n!}\right)$, *wheren* is a natural number greater than 1 and [.] denotes the greatest integer function..

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415. For $x \in R$ and a continuous function f, let $I_1 = \int_{\sin^2 t}^{1+\cos^2 t} xf\{x(2-x)\}dx$ and $I_2 = \int_{\sin^2 t}^{1+\cos^2 t} f\{x(2-x)\}dx$.Then $\frac{I_1}{I_2}$ is (a) -1 (b) 1 (c) 2 (d) 3

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416. Evaluate of each of the following integrals $\int_{\pi/6}^{\pi/3}\frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$

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417. Given a function $f:[0,4] \to R$ is differentiable ,then prove that for some $\alpha, \beta \in (0,2)$, $\int_0^4 f(t)dt = 2\alpha f\left(\alpha^2\right) + 2\beta f\left(\beta^2\right)$.

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418. Evaluate: $\int_0^{\frac{\pi}{2}} \log\left(\frac{4 + 3\sin x}{4 + 3\cos x}\right) dx$

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419. The value of $\int_0^1 4x^3 \left\{ \frac{d^2}{dx^2} \left(1 - x^2\right)^5 \right\} dx$ is

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420. Evaluate: $\int_{-\pi}^{3\pi} \log(sec\theta - tan\theta) d\theta$

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421. The value of the integral $\int_0^1 e^{x^2} dx$ lies in the integral

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422. Let $P(x)$ be a polynomial of least degree whose graph has three points of inflection $(-1, -1), (1.1)$and a point with abscissa 0 at which the curve is inclined to the axis of abscissa at an angle of 60°. Then find the value of$\int_0^1 p(x)dx$.

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423. $If I_n = \int_0^1 \frac{dx}{\left(1+x^2\right)^n}, where n \in N,$ which of the following statements hold good? (a) $2nI_{n+1} = 2^{-n} + (2n-1)I_n$

(b) $I_2 = \frac{\pi}{8} + \frac{1}{4}$ (c) $I_2 = \frac{\pi}{8} - \frac{1}{4}$ (d) $I_3 = \frac{3\pi}{32} + \frac{1}{4}$

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424. If $f(0) = 1, f(2) = 3, f'(2) = 5$,then find the value of $\int_0^1 xf''(2x)dx$

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425. $If \int_a^b \frac{f(x)}{f(x) + f(a + b - x)} dx = 10, then \quad b = 22, a = 2$ (b) $b = 15, 1 = -5$ $b = 10, a = -10$ (d) $b = 10, a = -2$

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426. Evaluate: $\int_0^{\pi} \frac{dx}{1 + \sin x}$

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427. If $I_n = \int_0^{\pi/4} \tan^n x dx$, ($n > 1$ is an integer), then (a) $I_n + I_{n-2} = \frac{1}{n+1}$ (b) $I_n + I_{n-2} = \frac{1}{n-1}$ (c) $I_2 + I_4, I_6, \ldots\ldots$ are in H.P. (d) $\frac{1}{2(n+1)} < I_n < \frac{1}{2(n-1)}$

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428. Consider the integral $\int_0^{2\pi} \frac{dx}{5 - 2\cos x}$ making the substitution $\tan\left(\frac{x}{2}\right) = t$, we have $I = \int_0^{2\pi} \frac{dx}{5 - 2\cos x} = \int_0^0 \frac{2dt}{\left(1 + t^2\right)\left[5 - 2\frac{1 - t^2}{1 + t^2}\right]} = 0$ The result is obviously wrong, since the integrand is positive and consequently the integral of this function cannot be equal to zero. Find the mistake.

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429. If $f(x) = \int_0^x |t - 1| dt$, where $0 \le x \le 2$ then (a) range of $f(x)$ is $[0, 1]$ (b) $f(x)$ is differentiable at $x = 1$ (c) $f(x) = \cos^{-1} x$ has two real roots (d) $f'\left(\frac{1}{2}\right) = \frac{1}{2}$

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430. If $\int_0^1 \frac{e^{-x} dx}{1 + e^x} = (\log)_e(1 + e) + k$, then find the value of k.

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431. The value of $\int_0^\infty \frac{dx}{1+x^4}$ is

A. (a) same as that of $\int_0^\infty \frac{x^2+1}{1+x} dx$

B. (b) $\frac{\pi}{2\sqrt{2}}$

C. (c) same as that of $\int_0^\infty \frac{x^2+1}{1+x^4} dx$

D. (d) $\frac{\pi}{\sqrt{2}}$

Answer: null

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432. Let f be a continuous function on $[a, b]$. Prove that there exists a number $x \in [a, b]$ such that $\int_a^x f(t)dx = \int_x^b f(t)dt$.

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433. If $f(x)$ is continuous for all real values of x, then $\sum_{r=1}^{n}\int_0^1 f(r-1+x)dx$ is equal to (a) $\int_0^n f(x)dx$ (b) $\int_0^1 f(x)dx$ (c) $\int_0^1 f(x)dx$ (d) $(n-1)\int_0^1 f(x)dx$

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434. F ind the value of $\int_0^1 \log x dx$.

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435. If $A_n = \int_0^{\frac{\pi}{2}} \frac{\sin(2n-1)x}{\sin x}dx, B_n = \int_0^{\frac{\pi}{2}} \left(\frac{\sin nx}{\sin x}\right)^2 dx$ for $n \in N$, Then (A) $A_{n+1} = A_n$ (B) $B_{n+1} = B_n$ (C) $A_{n+1} - A_n = B_{n+1}$ (D) $B_{n+1} - B_n = A_{n+1}$

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436. A continuous real function f satisfies $f(2x) = 3f(x) \forall x \in R$. If $\int_0^1 f(x)dx = 1$, then find the value of $\int_1^2 f(x)dx$

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437. The value of $\int_0^1 \frac{2x^2 + 3x + 3}{(x+1)\left(x^2 + 2x + 2\right)} dx$ is

A. (a) $\frac{\pi}{4} + 2\log 2 - \tan^{-1} 2$

B. (b) $\frac{\pi}{4} + 2\log 2 - \frac{\tan^{-1} 1}{3}$

C. (c)$2\log 2 - \cot^{-1} 3$

D. (d) $-\frac{\pi}{4} + \log 4 + \cot^{-1} 2$

Answer: null

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438. Evaluate: $\int_0^{1/\sqrt{2}} \frac{\sin^{-1} x}{\left(1 - x^2\right)^{3/2}} dx$

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439. If $f(x)$ is differentiable and $\int_0^{t^2} xf(x)dx = \frac{2}{5}t^5$, then $f\left(\frac{4}{25}\right)$ equals (a) $\frac{2}{5}$ (b) $-\frac{5}{2}$ (c) 1 (d) $\frac{5}{2}$

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440. Evaluate: $\int_1^{\infty} \left(e^{x+1} + e^{3-x}\right)^{-1} dx$

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441. If $f(x) = \int_{x^2}^{x^2+1} e^{-t^2} dt$, then $f(x)$ increases in

A. (a) $(0, 2)$

B. (b) no value of x

C. (c) $(0, \infty)$

D. (d) $(-\infty, 0)$

Answer: null

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442. Estimate the absolute value of the integral $\int_{10}^{19} \frac{\sin x}{1 + x^8} dx$

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443. If $I(m, n) = \int_0^1 t^m (1 + t)^n . dt$, then the expression for $I(m, n)$ in terms of $I(m + 1, n - 1)$ is:

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444. Prove that $4 \leq \int_1^3 \sqrt{3 + x^2} dx \leq 4\sqrt{3}$

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445. If $I_1 = \int_0^{\pi/2} \frac{\cos^2 x}{1 + \cos^2 x} dx$, $I_2 = \int_0^{\pi/2} \frac{\sin^2 x}{1 + \sin^2 x} dx$ and $I_3 = \int_0^{\pi/2} \frac{1 + 2\cos^2 x \sin^2 x}{4 + 2\cos^2 x \sin^2 x} dx$, then (a) $I_1 = I_2 > I_3$ (b) $I_3 > I_1 = I_2$ (c)

$I_1 = I_2 = I_3$ (d) none of these

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446. Prove that $\int_0^1 \sqrt{(1+x)\left(1+x^3\right)}\,dx$ cannot exceed $\sqrt{\frac{15}{8}}$.

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447. Let $T > 0$ be a fixed real number. Suppose f is continuous function such that for all $x \in R, f(x+T) = f(x)$. If $I = \int_0^T f(x)dx$, then the value of $\int_3^{3+3T} f(2x)dx$ is (a) $\frac{3}{2}I$ (b) $2I$ (c) $3I$ (d) $6I$

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448. Evaluate: $\int_0^1 \frac{1}{\sqrt{1-x^2}} \sin^{-1}\left(2x\sqrt{1-x^2}\right)dx$.

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449. Let $f(x) = \int_1^x \sqrt{2 - t^2}dt$. Then the real roots of the equation $x^2 - f'(x) = 0$ are (a)± 1 (b) $\pm \frac{1}{\sqrt{2}}$ (c)$\pm \frac{1}{2}$ (d) 0 and 1

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450. Evaluate: $\int_{-\pi/2}^{\pi/2} \sqrt{\cos x - \cos^3 x}dx$

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451. If $f(2 - x) = f(2 + x)$ and $f(4 - x) = f(4 + x)$ for all x and $f(x)$ is a function for which $\int_0^2 f(x)dx = 5$, then $\int_0^{50} f(x)dx$ is equal to

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452. $\int_{-1}^{2} \left|x^3 - x\right| dx$

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453. If $f(x)$ is integrable over $[1, 2]$, then $\int_1^2 f(x)dx$ is equal to (a) $(\lim)_{n \to \infty} \frac{1}{n} \sum_{r=1}^{n} f\left(\frac{r}{n}\right)$ (b) $(\lim)_{n \to \infty} \frac{1}{n} \sum_{r=n+1}^{2n} f\left(\frac{r}{n}\right)$ (c) $(\lim)_{n \to \infty} \frac{1}{n} \sum_{r=1}^{n} f\left(\frac{r+n}{n}\right)$ (d) $(\lim)_{n \to \infty} \frac{1}{n} \sum_{r=1}^{2n} f\left(\frac{r}{n}\right)$

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454. Evaluate: $\int_{-\frac{\pi}{2}}^{2\pi} \sin^{-1}(\sin x)dx$

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455. The value of $\int_0^{\frac{\pi}{4}} \sin 2x dx$ is

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456. Let: $a_n = \int_0^{\frac{\pi}{2}} (1 - \sin t)^n \sin 2t dt$ Then find the value of $\lim_{n \to \infty} n a_n$

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457. Q. $\int_0^{\pi} e^{\cos^2 x}\left(\cos^3(2n+1)x dx, n \in I\right.$

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458. Prove that $\int_0^{102}(x-1)(x-2)..(x-100) \times \left(\frac{1}{x-1}+\frac{1}{x-2}+.... .+\frac{1}{x-100}\right)dx = 101! - 100!$

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459. Let $f:[0,2] \to R$ be a function which is continuous on [0,2] and is differentiable on (0,2) with $f(0) = 1$ $Let: F(x) = \int_0^{x^2} f\left(\sqrt{t}\right)dtf$ or $x \in [0,2] IfF'(x) = f'(x)$. for all $x \in (0,2)$, then $F(2)$ equals (a)$e^2 - 1$ (b) $e^4 - 1$ (c)$e - 1$ (d) e^4

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460. Evaluate: $\int_0^1 \frac{1}{\left(1+x^2\right)\sqrt{1-x^2}} dx$

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461. If $f(x) = \begin{cases} e^{\cos x}\sin x & |x| \leq 2 \\ 2 & otherwise \end{cases}$. Then $\int_{-2}^{3} f(x)dx =$ _____

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462. Evaluate: $\int_0^{\pi/2} \frac{1}{\left(a^2\cos^2 x + b^2\sin^2 x\right)^2} dx$

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463. Prove that: $\int_0^{2\pi} \frac{x\sin^{2n} x}{\sin^{2n} + \cos^{2n} x} dx = \pi^2$

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464. Prove that $1 < \int_0^2 \left(\frac{5 - x}{9 - x^2} \right) dx < \frac{6}{5}$

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465. If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less than $\sqrt{5}$, then the set of possible values of a is (1) $(-3, 3)$ (2) $(-3, \infty)$ (3) $(3, \infty)$ (4) $(-\infty, -3)$

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466. If m is the least value (global minimum) and M is the greatest value (global maximum) of the function $f(x)$ on the interval $[a, b]$ (estimation of an integral), then $m(b - a) \leq \int_a^b f(x)dx \leq M(b - a)$.

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467. Let $f: R \rightarrow R$ be a continuous function which satisfies $f(x) = \int_0^x f(t)dt$.

Then the value of $f(1n5)$ is_____

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468. Show that $\int_a^b \frac{|x|}{x} dx = |b| - |a|$.

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469. The value of $\frac{\pi^2}{1n3} \int_{\frac{7}{6}}^{\frac{5}{6}} \sec(\pi x) dx is$ __

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470. Let: $f(x) = \int_0^x |2t - 3| dt$. Then discuss continuity and differentiability of $f(x) at x = \frac{3}{2}$

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471. If $\int_a^b (f(x) - 3x)dx = a^2 - b^2$ then the value of $f\left(\frac{\pi}{6}\right)$ is ___

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472. $Let I_1 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x}{x} dx, I_2 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin(\sin x)}{\sin x} dx, I_3 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin(\tan x)}{\tan x} dx$ Then arrange in the decreasing order in which values I_1, I_2, I_3 lie.

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473. The value of $\int_0^1 e^{x^2 - x} dx$ is (a) < 1 (b) > 1 (c) $> e^{-\frac{1}{4}}$ (d) `

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474. Evaluate: $\int_0^1 x \frac{dx}{\sqrt{1 - x^2}}$

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475. The value of the definite integral $\int_0^1 \left(1 + e^{-x^2}\right) dx$ is

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476. Prove that $0 < \int_0^1 \frac{x^7 dx}{\left(1 + x^8\right)^{\frac{1}{3}}} < \frac{1}{8}$

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477. Let a, b, c be nonzero real numbers such that $\int_0^1 \left(1 + \cos^8 x\right)\left(ax^2 + bx + c\right) dx = \int_0^2 \left(1 + \cos^8 x\right)\left(ax^2 + bx + c\right) dx = 0$ Then show that the equation $ax^2 + bx + c = 0$ will have one root between 0 and 1 and other root between 1 and 2.

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478. Let $f(x)$ be a continuous and differentiable function such that $f(x) = \int_0^x \sin\left(t^2 - t + x\right)dt$ Then prove that $f''(x) + f(x) = \cos x^2 + 2x\sin x^2$

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479. Evaluate: $5050\dfrac{\int 01\left(1 - x^{50}\right)^{100}dx}{\int 01\left(1 - x^{50}\right)^{101}dx}$

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480. $If\int_{\frac{\pi}{3}}^{x}\sqrt{\left(3 - \sin^2 t\right)}dt + \int_0^y \cos t dt = 0, then evaluate \dfrac{dy}{dx}$

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481. If $f(x) = \int_0^x (\cos(\sin t) + \cos(\cos t)dt, then f(x + \pi) is$ (a) $f(x) + f(\pi)$ (b) $f(x) + 2(\pi)$ (c) $f(x) + f\left(\dfrac{\pi}{2}\right)$ (d) $f(x) + 2f\left(\dfrac{\pi}{2}\right)$

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482. Evaluate: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \log\left(\frac{a - \sin\theta}{a + \sin\theta}\right) d\theta, a > 0$

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483. Evaluate: $\int_0^1 \frac{dx}{1 + x^2}$

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484. If $f(t)$ is an odd function, then prove that $\varphi(x) = \int_a^x f(t)dt$ is an even function.

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485. Evaluate: $\int_2^3 \frac{2x^5 + x^4 - 2x^3 + 2x^2 + 1}{\left(x^2 + 1\right)\left(x^4 - 1\right)} dx$

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486. Find the value of $\int_0^1 \left\{ \left(\sin^{-1} x \right) / x \right\} dx.$

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487. Show that $\int_0^{n\pi + v} |\sin x| dx = 2n + 1 - \cos v,$ where n is a positive integer and ,$0 \leq v < \pi$

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488. Find $I = \int_0^{\pi} \ln(1 + \cos x) dx$

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489. The value of $\int_a^b (x - a)^3 (b - x)^4 dx$ is

A. (a) $\frac{(b - a)^4}{6^4}$

B. (b) $\frac{(b-a)^8}{280}$

C. (c) $\frac{(b-a)^7}{7^3}$

D. (d) none of these

Answer: null

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490. Evaluate: $\int_{-\frac{1}{2}}^{\frac{1}{2}} \left[\left(\frac{x+1}{x-1} \right)^2 + \left(\frac{x-1}{x+1} \right)^2 - 2 \right]^{\frac{1}{2}} dx$

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491. The value of $\int_{-a}^{a} \left(\cos^{-1} x - \sin^{-1} \sqrt{1-x^2} \right) dx$ is $(a > 0)$ there $\int_0^a \cos^{-1} x dx = A \Big)$ is

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492. If f is an odd function, then evaluate $I = \int_{-a}^{a} \frac{f(\sin x)dx}{f(\cos x) + f\left(\sin^2 x\right)}$

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493. Evaluate : $\int_0^{\frac{\pi}{4}} \log(1 + \tan x)dx.$

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494. Evaluate: $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{x^9 - 3x^5 + 7x^3 - x + 1}{\cos^2 x} dx$

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495. Let $a + b = 4, wherea < 2, andletg(x)$ be a differentiable function. If $\frac{dg}{dx} > 0$ for all $x,$ prove that $\int_0^a g(x)dx + \int_0^b g(x)dx \in crerasesas(b - a) \in crerases$

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496. Evaluate: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \log\left\{\frac{ax^2+bx+c}{ax^2-bx+c}(a+b)|\sin x|\right\}dx$

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497. If $U_n = \int_0^{\pi} \frac{1-\cos nx}{1-\cos x}dx$, where n is positive integer or zero, then show that $U_{n+2}+U_n = 2U_{n+1}$. Hence, deduce that $\int_0^{\frac{\pi}{2}} \frac{\sin^2 n\theta}{\sin^2\theta} = \frac{1}{2}n\pi$.

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498. Evaluate: $\int_{-1}^{1} \frac{x^3+|x|+1}{x^2+2|x|+1}dx$

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499. Find the value of $\int_{-1}^{\frac{3}{2}} |x\sin\pi x|dx$

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500. Evaluate: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos^2 x(\sin x + \cos x)dx$

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501. $\int_{-1}^{2} \left[\frac{[x]}{1+x^2}\right] dx, where[.]$ denotes the greater integer function, is equal to (a)-2 (b) -1 (c)0 (d) none of these

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502. Evaluate: $\int_a^b \cos x dx$

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503. Let $f: R \to R$ be a continuous function and $f(x) = f(2x)$ is true $\forall x \in R$. If $f(1) = 3$, then the value of $\int_{-1}^{1} f(f(x))dx$ is equal to

A. (a) 6

B. (b) 0

C. (c) $3f(3)$

D. (d) $2f(0)$

Answer: null

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504. Evaluate: $(\lim)_{n \to \infty} \frac{\left(1^2 + 2^2 + 3^3 + \ + n^2\right)\left(1^3 + 2^3 + 3^3 + \ + n^3\right)}{1^6 + 2^6 + 3^6 + \ + n^6}$

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505. if $\int \frac{dx}{x^2\left(x^n + 1\right)\left(\frac{n-1}{n}\right)} = -[f(x)]^{\frac{1}{n}} + c, then f(x) is$ $\left(1 + x^n\right)$ (b) $1 + x^{-1}$ $x^n + x^{-n}$ (d) none of these

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506. Evaluate the definite integrals as limit of sums $\int_1^2 x^2 dx$

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507. Evaluate: $\int_a^b \sin x dx$ using limit of sum

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508. $\int_{-3}^{3} x^8 \left\{ x^{11} \right\} dx$

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509. Evaluate: $\int_a^b e^x dx$ using limit of sum

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510. The value of $\int_{-2}^{1}\left[x\left[1+\cos\left(\frac{\pi x}{2}\right)\right]+1\right]dx,$ where [.] denotes the greatest integer function, is (a)1 (b) $1/2$ (c) 2 (d) none of these

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511. Evaluate: $\lim_{n\to\infty}\frac{((n+1)(n+2)...(n+n))^{\frac{1}{n}}}{n}$

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512. If $g(x)=\int_0^x(|\sin t|+|\cos t|)dt$,then $g\left(x+\frac{\pi n}{2}\right)$ is equal to, where $n\in N,$

(a) $g(x)+g(\pi)$ (b) $g(x)+g\left(\frac{n\pi}{2}\right)$ (c) $g(x)+g\left(\frac{\pi}{2}\right)$ (d) none of these

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513. Evaluate: $\lim_{n\to\infty}\left[\frac{1}{na}+\frac{1}{na+1}+\frac{1}{na+2}++\frac{1}{nb}\right]$

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514. $\int_0^x |\sin t| dt$, where $x \in (2n\pi, (2n+1)\pi), n \in N$, is equal to (A) $4n - \cos x$ (B) $4n - \sin x$ (C) $4n + 1 - \cos x$ (D) $4n - 1 - \cos x$

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515. Evaluate $\lim_{n \to \infty} n \left[\frac{1}{(n+1)(n+2)} + \frac{1}{(n+2)(n+4)} + ... + \frac{1}{6n^2} \right]$

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516. Let f(x) be an odd continous function which is periodic with period 2.

If $g(x) = \int_0^x f(t) dt$, then

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517. Evaluate $\int_a^b \frac{dx}{\sqrt{x}}$, $wherea, b > 0.$

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518. Let $f: R\vec{a}ndg: R\vec{R}$ be continuous function. Then the value of the integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \pi[f(x) + f(-x)][g(x) - g(-x)]dxis$ (a)π (b) 1 (c) -1 (d) 0

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519. Evaluate: $\int_{-\frac{3\pi}{2}}^{-\frac{\pi}{2}} \left[(x+\pi)^3 + \cos^2(x+3\pi)\right]dx$

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520. Evaluate: $\int_0^{\frac{1}{2}} \frac{x\sin^{-1}x}{\sqrt{1-x^2}}dx$

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521. Evaluate: $\int_0^{100} x - [x]dx$ where [.] represents the greatest integer function).

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522. If $S_n = \left[\frac{1}{1+\sqrt{n}} + \frac{1}{2+\sqrt{2n}} + ... + \frac{1}{n+\sqrt{n^2}}\right]$ then $(\lim)_{n \to \infty} S_n$ is equal to (A) $\log 2$ (B) $\log 4$ (C) $\log 8$ (D) none of these

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523. The value of $(\lim)_{n \to \infty} \sum_{r=1}^{4n} \frac{\sqrt{n}}{\sqrt{r}\left(3\sqrt{r}+\sqrt{n}\right)^2}$ is equal to $\frac{1}{35}$ (b) $\frac{1}{4}$ (c) $\frac{1}{10}$ (d) $\frac{1}{5}$

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524. Evaluate: $\frac{\int 0n[x]dx}{\int 0n\{x\}dx}(where[x]and\{x\}$ are integral and fractional parts of $xandn \in N\Big)$.

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525. Evaluate: $\int_{-\frac{\pi}{4}}^{n\pi-\frac{\pi}{4}} |\sin x + \cos x| dx$

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526. The value of $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\tan^3 x}$ is (a) 0 (b) 1 (c) $\frac{\pi}{2}$ (d) π

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527. Evaluate: $\int_{-\pi}^{\pi} \left(1 - x^2\right) \sin x \cos^2 x dx$

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528. Let f be a contiuous function on $[a, b]$. If

$$F(x) = \left(\int_a^x f(t)dt - \int_x^b f(t)dt\right)(2x - (a + b)),$$

then prove that there exist some $c\varepsilon(a, b)$ such that

$$\int_a^c f(t)dt - \int_c^b f(t)dt = f(c)(+ b - 2c)$$

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529. Evaluate the following: $\int_{-1}^{1} \frac{\sin x - x^2}{3 - |x|} dx$

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530. If $\int_a^b |\sin x| dx = 8$ and $\int_0^{a+b} |\cos x| dx = 9$, then

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531. Evaluate: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sqrt{\cos^{2n-1} x - \cos^{2n+1} x} dx, \text{ where } n \in N$

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532. $f(x)$ is a continuous and bijective function on R. If $\forall t \in R$, then the area bounded by $y = f(x), x = a - t, x = a$, and the x-axis is equal to the area bounded by $y = f(x), x = a + t, x = a$, and the x-axis. Then prove that $\int_{-\lambda}^{\lambda} f^{-1}(x)dx = 2a\lambda(giventhatf(a) = 0)$.

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533. Evaluate: $\int_{-\frac{1}{2}}^{\frac{1}{2}} {}_1 \cos x \log\left(\frac{1-x}{1+x}\right)dx$

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534. $f(x) = \int_0^x f(t)dt = x + \int_x^1 tf(t)dt$, then the value of $f(1)$ is

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535. Evaluate: $\int_0^x [\cos t] dt where x \in \left(2n\pi, \left(4n + 1\frac{\pi}{2}\right), n \in N, and [.]\right.$ denotes the greatest integer function.

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536. Suppose f is a real-valued differentiable function defined on $[1, \infty]$ with $f(1) = 1$. Moreover, suppose that f satisfies $f'(x) = \frac{1}{x^2 + f^2(x)} Show that f(x) < 1 + \frac{\pi}{4} \forall x \geq 1.$

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537. Let f be a real valued function satisfying

$f(x) + f(x + r) = f(x + 2) + f(x + 6)$

Prove that $\int_x^{x+8} f(t) dt$ is a constant function.

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538. If $x\int_0^x \sin(f(t))dx = (x+2)\int_0^1 t\sin(f(t))dt$, where $x > 0$, then show that $f'(x)\cot f(x) + \frac{3}{1+x} = 0$

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539. Evaluate: $\int_0^2 \frac{dx}{\left(17 + 8x - 4x^2\right)\left[e^{6(1-x)} + 1\right)}$

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540. $If f(x) = \int_{\frac{x^2}{16}}^{x^2} \frac{\sin x \sin\sqrt{\theta}}{1 + \cos^2\sqrt{\theta}} d\theta$, then find the value of $f'\left(\frac{\pi}{2}\right)$.

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541. Find the equation of tangent to the $y = F(x)$ at $x = 1$, where $F(x) = \int_x^{x^3} \frac{dt}{\sqrt{1+t^2}}$

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542. If $\int_0^x [x]dx = \int_0^{[x]} xdx,$ then prove that either x is purely fractional or x is such that $\{x\} = \frac{1}{2}(where[.]and\{.\}$ denote the greatest integer and fractional part, respectively).

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543. Show that: $\int_0^{\pi/2} f(\sin 2x)\sin x dx = \sqrt{2}\int_0^{\pi/4} f(\cos 2x)\cos x dx$

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544. $If I_1 = \int_0^1 2^{x^2} dx, I_2 = \int_0^1 2^{x^3} dx, I_3 = \int_1^2 2^{x^2} dx, I_4 = \int_1^2 2^{x^3} dx,$ then which of the following is/are true?

A. (a) $I_1 > I_2$

B. (b) $I_2 > I_1$

C. (c) $I_3 > I_4$

D. (d) $I_3 < I_4$

Answer: null

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545. If $af(x)+bf\left(\frac{1}{x}\right) = \frac{1}{x} - 5, x \neq 0, a \neq b$, then $\int_1^2 f(x)dx$ equals

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546. Find the mistake in the following evaluation of the integral $I = \int_0^{\pi} \frac{dx}{\cos^2 x + 3\sin^2 x}$ then : $I = \int_0^{\pi} \frac{dx}{1 + 2\sin^2 x}$,

$$= \int_0^{\pi} \frac{\sec^2 x dx}{1 + 3\tan^2 x} = \frac{1}{\sqrt{3}}\left[\tan^{-1}\left(\sqrt{3}\tan x\right)\right]_{\pi}^{0} = 0$$

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547. Find the value of $\int_{-1}^{1} \frac{d}{dx}\left(\tan^{-1}\left(\frac{1}{x}\right)\right)dx$

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548. The value of $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x}+\sqrt{x}}dx$ is _____

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549. The value of $\int_{-2}^{2} \left|1-x^2\right| dx$ is_____

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550. If $I_I = \int_0^{\pi/2} \cos(\sin x)dx, I_2 = \int_0^{\frac{\pi}{2}} \sin(\cos x)dx$, *and* $I_3 = \int_0^{\frac{\pi}{2}} \cos x dx,$ then find the order in which the values $I_1, I_2, I_3,$ exist.

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551. The integral $\int_0^{1.5}\left[x^2\right]dx, where[.]$ denotoes the greatest integer function, equals .....

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552. Evaluate the following limit:

$$\lim n \to \infty \frac{\sum_{r=1}^{n}\sqrt{r}\sum_{r=1}^{h}\frac{1}{\sqrt{r}}}{\sum_{r=1}^{n}r}$$

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553. Evaluate: $(\lim)_{n \to \infty}\left[\frac{n!}{n^n}\right]^{1/n}$

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554. If the value of the definite integral $\int_0^1 {}^{207}C_7 x^{200}(1-x)^7 dx$ is equal to $\frac{1}{k}$, $where k \in N$, then the value of $\frac{k}{26}$ is____

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555. Evaluate: $\int_{-1}^{0} \frac{dx}{x^2+2x+2}$

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556. If $fandg$ are continuous function on $[0, a]$ satisfying $f(x) = f(a-x) and g(x) + g(a-x) = 2$, then show that $\int_0^a f(x)g(x)dx = \int_0^a f(x)dx$.

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557. If $f(x) = \min\left(|x|, 1-|x|, \frac{1}{4}\right) \forall x \in R$, then find the value of $\int_{-1}^{1} f(x)dx$.

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558. Evaluate: $\int_0^{\pi} e^{|\cos x|}\left(2\sin\left(\frac{1}{2}\cos x\right) + 3\cos\left(\frac{1}{2}\cos x\right)\right)\sin x dx$.

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559. Evaluate: $\int_a^b x^3 dx$

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560. Find the value of $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \frac{\pi + 4x^3}{2 - \cos\left(|x| + \frac{\pi}{3}\right)} dx$

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561. Evaluate: $(\lim)_{n \to \infty}\left(\frac{1}{\sqrt{4n^2 - 1}} + \frac{1}{\sqrt{4n^2 - 2^2}} + + \frac{1}{\sqrt{3n^2}}\right)$

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562. If $y(x) = \int_{\frac{\pi^2}{16}}^{x^2} \frac{\cos x \cos\sqrt{\theta}}{1 + \sin^2\sqrt{\theta}} d\theta$, find $\frac{dy}{dx}$ at $x = \pi$.

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563. Evaluate: $(\lim)_{n \to \infty} \left[\frac{1}{n^2} \frac{\sec^2 1}{n^2} + 2/n^2 \frac{\sec^2 4}{n^2} + + \frac{1}{n} \sec^2 1 \right]$

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564. For $x > 0$, $let f(x) = \int_1^x \frac{\log t}{1 + t} dt$. Find the function $f(x) + f\left(\frac{1}{x}\right)$ and find the value of $f(e) + f\left(\frac{1}{e}\right)$.

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565. Evaluate $(\lim)_{n \to \infty} \sum_{k=1}^{n} \frac{k}{n^2 + k^2}$

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566. If" f, is a continuous function with $\int_0^x f(t)dt \to \infty$ as $|x \mapsto \infty$then show that every line $y = mx$ intersects the curve $y^2 + \int_0^x f(t)dt = 2$

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567. Prove that $\frac{\pi}{6} < \int_0^1 (dx)\left(\sqrt{4 - x^2 - x^3}\right) < \frac{\pi}{4\sqrt{2}}$

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568. Let $f: [-1, 2] \to [0, \infty)$ be a continuous function such that $f(x) = f(1 - x) f \text{ or } all x \in [-1, 2]$. Let $R_1 = \int_{-1}^{2} x f(x) dx,$ and R_2 be the area of the region bounded by $y = f(x), x = -1, x = 2,$ and the x-axis . Then (a) $R_1 = 2R_2$ (b) $R_1 = 3R_2$ (c)$2R_1$ (d) $3R_1 = R_2$

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569. Prove that $\int_0^x e^{xt-t^2}\,dt = e^{\frac{x^2}{4}}\int_0^x e^{-\left(\frac{t^2}{4}\right)}\,dt$

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570. If $\alpha = \int_0^1 \left(e^{9x+3\tan^{-1}x}\right)\left(\frac{12+9x^2}{1+x^2}\right)dx$ where $\tan^{-1}x$ takes only principal values, then, find the value of $\left((\log)_e|1+\alpha| - \frac{3\pi}{4}\right)$

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571. Evaluate $\int_{-4}^{-5} e^{(x+5)^2}dx + 3\int_{1/3}^{2/3} e^9\left(x-\frac{2}{3}\right)^2 dx.$

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572. Prove that for any positive integer k, $\frac{\sin 2kx}{\sin x} = 2[\cos x + \cos 3x + \ + \cos(2k-1)x]$. Hence, prove that

$\int_0^{\frac{\pi}{2}} \sin 2xk\cot x dx = \frac{\pi}{2}$.

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573. Compute the integrals: $\int_0^{\infty} f\left(x^n + x^{-n}\right)\log x \frac{dx}{x}$

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574. If for a real number y, $[y]$ is the greatest integral function less, then or equal to y, then the value of the integral $\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} [2\sin x]dx$ is $-\pi$ (b) 0 (c) $-\frac{\pi}{2}$ (d) $\frac{\pi}{2}$

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575. Compute the integrals: $\int_0^{\infty} f\left(x^n + x^{-n}\right)\log x \frac{dx}{1 + x^2}$

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576. $\int_0^x \left\{ \int_0^u f(t)dx \right\} du$ is equal to (a) $\int_0^x (x - u)f(u)du$ (b) $\int_0^x uf(x - u)du$ (c) $x\int_0^x f(u)du$ (d) $x\int_0^x uf(u - x)du$

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577. Compute the integrals: $\int_{\frac{1}{e}}^{e} \frac{1}{x} \sin\left(x - \frac{1}{x}\right) dx$

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578. STATEMENT 1: $\int_0^\pi x\sin x\cos^2 x dx = \frac{\pi}{2}\int_0^\pi \sin x\cos^2 x dx.$

STATEMENT 2: $\int_a^b xf(x)dx = \frac{a + b}{2}\int_a^b f(x)dx.$

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579. Evaluate: $\int_0^{\frac{\pi}{2}} x\cos x dx$

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580. Evaluate: $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16\sin 2x} dx$

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581. Evaluate: $\int_{-\pi/4}^{\pi/4} \log(\sin x + \cos x) dx$

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582. If $\alpha, \beta(\beta > \alpha)$, are the roots of $g(x) = ax^2 + bx + c = 0$ and $f(x)$ is an even function, then $\int_\alpha^\beta \frac{e^f\left(\frac{g(x)}{x-\alpha}\right)}{e^f\left(\frac{g(x)}{x-\alpha}\right) + e^f\left(\frac{g(x)}{x-\beta}\right)} =$ (a) $\left|\frac{b}{2a}\right|$ (b) $\frac{\sqrt{b^2 - 4ac}}{|2a|}$ (c) $\left|\frac{b}{a}\right|$ (d) none of these

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583. Consider the function $f(x)$ satisfying the relation $f(x+1)+f(x+7)=0\,\forall x \in R$. STATEMENT 1 : The possible least value of t for which $\int_a^{a+t} f(x)dx$ is independent of $ais12$. STATEMENT 2 : $f(x)$ is a periodic function.

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584. Let $f: R\vec{R}$ be a differentiable function having $f(2)=6, f'(2)=\frac{1}{48}$. Then evaluate $(\lim)_{x\bar{2}}\int_6^{f(x)} \frac{4t^3}{x-2}dt$

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585. $If\int_{\sin x}^{1} t^2 f(t)dt = 1 - \sin x, where. x \in \left(0, \frac{\pi}{2}\right)$, then find the value of $f\left(\frac{1}{\sqrt{3}}\right)$.

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586. Prove that $\int_a^b f(x)dx = \int_{a+c}^{b+c} f(x-c)dx$, and when $f(x)$ is odd function, $\int_{-a}^{a} f(x)dx = 0$

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587. Evaluate: $\int_0^{100\pi} \sqrt{(1-\cos 2x)}dx$.

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588. Evaluate: $\int_0^{\pi} \frac{xdx}{1+\cos\alpha\sin x}, where 0 < \alpha < \pi$.

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589. Evaluate : $\int_0^{\frac{\pi}{4}} \frac{\sin x\cos x}{\sin^4 x + \cos^4 x} dx$

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590. A periodic function with period 1 is integrable over any finite interval. Also, for two real numbers a,b and two unequal non-zero positive integers m and n $\int_a^{a+n} f(x)dx = \int_b^{b+m} f(x)$ calculate the value of $\int_m^n f(x)dx$

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591. Evaluate: $\int \cos^3 x e^{\log \sin x} dx$

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592. The value of the integral $\int_{-\frac{3\pi}{4}}^{\frac{5\pi}{4}} \left(\frac{\sin x + \cos x}{e^{x-\frac{\pi}{4}} + 1} \right) dx$ (A) 0 (B) 1 (C) 2 (D) none of these

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593. $If \int_0^{n\pi} f\left(\cos^2 x\right) dx = k \int_0^{\pi} f\left(\cos^2 x\right) dx, then f \in dthevaluek$

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594. $\int_{2-a}^{2+a} f(x)dx$ is equal to [where $f(2-\alpha) = f(2+\alpha) \forall \alpha \in R$

(a) $2\int_{2}^{2+a} f(x)dx$ (b) $2\int_{0}^{a} f(x)dx$ (c) $2\int_{2}^{2} f(x)dx$ (d) none of these

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595. Evaluate: $\int_{0}^{a} \frac{dx}{x + \sqrt{(a^2 - x^2)}}$ or $\int_{0}^{\frac{\pi}{2}} \frac{d\theta}{1 + \tan\theta}$

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596. Suppose that $F(x)$ is an anti derivative of $f(x) = \frac{\sin x}{x}$, where $x > 0$. Then $\int_{1}^{3} \frac{\sin 2x}{x} dx$ can be expressed as

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597. Evaluate: $\int_{-\pi}^{\pi} \frac{x\sin x dx}{e^x + 1}$

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598. $If \int_0^1 \cot^{-1}\left(1 - x + x^2\right)dx = \lambda \int_0^1 \tan^{-1} x dx, then \lambda is equal \rightarrow$ 1 (b) 2 (c) 3 (d) 4

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599. Show that $\int_0^{\frac{\pi}{2}} \sqrt{(\sin 2\theta)} \sin\theta d\theta = \frac{\pi}{4}$

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600. The number of positive continuous $f(x)$ defined in $[0, 1]$ for with $I_1 = \int_0^1 f(x)dx = 1, I_2 = \int_0^1 xf(x)dx = a,$

$I_3 = \int_0^1 x^2 f(x)dx = a^2$ is /are

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601. $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx$

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602. The value of the definite integral $\int_0^{\frac{\pi}{2}} \sqrt{\tan x} dx$ is $\sqrt{2}\pi$ (b) $\frac{\pi}{\sqrt{2}}$ $2\sqrt{2}\pi$ (d) $\frac{\pi}{2\sqrt{2}}$

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603. For $\theta \in \left(0, \frac{\pi}{2}\right)$, prove that $\int_0^{\theta} \log(1 + \tan\theta \tan x) dx = \theta \log(\sec\theta)$

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604. A function f is defined by $f(x) = \frac{1}{2^{r-1}}, \frac{1}{2^r} < x \leq 1\left(2^{r-1}\right), r = 1, 2, 3$ then the value of $\int_0^1 f(x) dx$

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605. Evaluate $\int_0^1 \frac{dx}{\left(5 + 2x - 2x^2\right)\left(1 + e^{2-4x}\right)} dx$

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606. If $P(x)$ is a polynomial of the least degree that has a maximum equal to 6 at $x = 1$, and a minimum equal to 2 at $x = 3$, then $\int_0^1 P(x)dx$ equals

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607. Evaluate: $\int_0^\pi x \log \sin x dx$

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608. The value of the definite integral $\int_0^{\sqrt{1n\left(\frac{\pi}{2}\right)}} \cos e^{x^2} 2xe^{x^2} dxis$ 1 (b) 1 + (sin1) 1 - (sin1) (d) (sin1) - 1

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609. Evaluate: $\int_0^{\frac{\pi}{2}} \cos 2x + 4\sin 2x \cos 2x dx$

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610. $Thevalueof \int_{1\ 2}^{1+\sqrt{5}} \frac{x^2+1}{x^4-x^2+1} \log\left(1+x-\frac{1}{x}\right) dxis$ (a) $\frac{\pi}{8}(\log)_e 2$ (b) $\frac{\pi}{2}(\log)_e 2$ (c)- $\frac{\pi}{2}(\log)_e 2$ (d) none of these

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611. If $f(x)$ is a function satisfying $f(x+a)+f(x)=0$ for all $x \in R$ and positive constant a such that $\int_b^{c+b} f(x)dx$ is independent of b, then find

the least positive value of c

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612. If $f(x)$ is monotonic differentiable function on $[a, b]$, then $\int_a^b f(x)dx + \int_{f(a)}^{f(b)} f^{-1}(x)dx =$ (a)$bf(a) - af(b)$ (b) $bf(b) - af(a)$ (c)$f(a) + f(b)$ (d) cannot be found

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613. Find the value of : $\int_0^{10} e^{2x - [2x]} d(x - [x]) where [.]$ denotes the greatest integer function).

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614. The range of the function $f(x) = \int_{-1}^{1} \frac{\sin x dt}{\left(1 - 2t\cos x + t^2\right)}$ is

A. (a) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B. (b) $[0, \pi]$

C. (c) $\{0, \pi\}$

D. (d) $\left\{-\frac{\pi}{2}, \frac{\pi}{2}\right\}$

Answer: null

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615. $LetA = \int_0^\infty \frac{\log x}{1+x^3} dx$ Then find the value of $\int_0^\infty \frac{x\log x}{1+x^3} dx$ in terms of A

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616. Let $y'(x) + y(x)g'(x) = g(x)g'(x), y(0) = 0, x \in R,$ where $f'(x)$ denotes $\frac{dy(x)}{dx}$, and $g(x)$ is a given non-constant differentiable function on R with $g(0) = g(2) = 0.$ Then the value of $y(2)$ is_____

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617. Show that : $\int_0^1 \frac{\log x}{(1+x)} dx = -\int_0^1 \frac{\log(1+x)}{x} dx$

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618. The value of $\lim_{n \to \infty} \left[\tan\left(\frac{\pi}{2n}\right)\tan\left(\frac{2\pi}{2n}\right) \ldots\ldots . \tan\left(\frac{n\pi}{2n}\right)\right]^{\frac{1}{n}}$ is

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619. Evaluate: $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$

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620. Match the statements/expression given in Column I with the values given in Column II. Column I, Column II (p) The number of polynomials $f(x)$ with non-negative integer coefficients of degree ≤ 2, satisfying $f(0) = 0$ and $\int_0^1 f(x)dx = 1, is$, 8 (q) The number of points in the interval

$\left[-\sqrt{13}, \sqrt{13}\right]$ at which $f(x) = \sin\left(x^2\right) + \cos\left(x^2\right)$ attains its maximum

.

value, is, 2 (r) $\int_{-2}^{2} \frac{3x^2}{1+e^x} dx$ equals, 4 (s) $\frac{\int_{-2}^{2} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx}{\int_{0}^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx}$, 0

.

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621. If $\int_0^t \frac{bx\cos 4x - a\sin 4x}{x^2} = \frac{a\sin 4t}{t} - 1$ where $0 < t < \frac{\pi}{4}$, then the values of a, b are, respectively, equal to (A) $\frac{1}{4}, 1$ (B) $-1, 4$ (C) $2, 2$ (D) $2, 4$

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622. If $I_1 = \int_0^{\pi} xf\left(\sin^3 x + \cos^2 x\right) dx and$ $I_2 = \int_0^{\frac{\pi}{2}} f\left(\sin^3 x + \cos^2 x\right) dx, then relate I_1 and I_2$

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623. $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

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624. If $U_n = \int_0^1 x^n (2 - x)^n dx and V_n = \int_0^1 x^n (1 - x)^n dx, n \in N,$ and if $\frac{V_n}{U_n} = 1024,$ then the value of n is_____

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625. Find the value of $\int_0^1 2x^3 - 3x^2 - x + 13 dx$.

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626. If $\int_0^\infty x^{2n+1} e^{-x^2} dx = 360,$ then the value of n is___

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627. Evaluate: $\int_0^{\infty} \frac{dx}{1+x^2}$

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628. $If\lambda = \int_0^{\frac{\pi}{2}} \cos\theta f\left(\sin\theta + \cos^2\theta\right) dth\eta$

$andI_2 = \int_0^{\pi/2} \sin 2\theta f\left(\sin\theta + \cos^2\theta\right) dth\eta$, $then\ I_1 = -2I_2$ (b) $I_1 = I_2$ $2I_1 = I_2$ (d) $I_1 = -I_2$

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629. If $f(a+b-x) = f(x)$, then prove that $\int_a^b xf(x)dx = \frac{a+b}{2}\int_a^b f(x)dx$.

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630. Let $I_1 = \int_{-2}^{2} \frac{x^6 + 3x^5 + 7x^4}{x^4 + 2} dx$ and $I_2 = \int_{-3}^{1} \frac{2(x+1)^2 + 11(x+1) + 14}{(x+1)^4 + 2} dt$

Then the value of $I_1 + I_2$ is (A) 8 (B) $\frac{200}{3}$ (C) $\frac{100}{3}$ (D) none of these

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631. Find the value of $\int_0^{\frac{\pi}{2}} \sin 2x dx$

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632. The value of $\int_0^{\frac{\pi}{2}} \cos^2 x dx$

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633. prove that $|\sin t|$ is non-differentiable at $t = \pi$.

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634. Find the value of $\int_0^1 x(1 - x)dx$

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635. Let $S_n = \sum_{k=0}^{n} \frac{n}{n^2 + kn + k^2}$ and $T_n = \sum_{k=0}^{n-1} \frac{n}{n^2 + kn + k^2}$ for n=1,2,3... then

(a)$S_n < \frac{\pi}{3}\sqrt{3}$ b) $S_n > \frac{\pi}{3}\sqrt{3}$(c) $T_n < \frac{\pi}{3}\sqrt{3}$ (d) $T_n > \frac{\pi}{3}\sqrt{3}$

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636. The value of the definite integral $\int_{\sqrt{2}-1}^{\sqrt{2}+1} \frac{x^4 + x^2 + 2}{\left(x^2 + 1\right)^2} dxequals$ _ _

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637. If a continuous function f on $[0, a]$ satisfies $f(x)f(a - x) = 1, a > 0,$ then find the value of $\int_0^a \frac{dx}{1 + f(x)}$

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638. $LetJ = \int_{-5}^{-4} \left(3 - x^2\right) \tan\left(3 - x^2\right) dx$ and $K = \int_{-2}^{-1} \left(6 - 6x + x^2\right) \tan\left(6x - x^2 - 6\right) dx$. Then (J+K) equals _____

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639. Let $g(x)$ be differentiable on R and $\int_{\sin t}^{1} x^2 g(x)dx = (1 - \sin t)$, where $t \in \left(0, \frac{\pi}{2}\right)$. Then the value of $g\left(\frac{1}{\sqrt{2}}\right)$ is____

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640. Show that $(\lim)_{n \to \infty}\left(\frac{1}{n+1} + \frac{1}{n+2} + + \frac{1}{6n}\right) = \log 6$

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641. $\int_{-\frac{\pi}{3}}^{0}\left[\cot^{-1}\left(\frac{2}{2\cos x - 1}\right) + \cot^{-1}\left(\cos x - \frac{1}{2}\right)\right]dx$ i s equal to $\frac{\pi^2}{6}$ (b) $\frac{\pi^2}{3}$ (c) $\frac{\pi^2}{8}$ (d) $\frac{3\pi^2}{8}$

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642. $If\int_{-\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{e^{\frac{\pi}{4}}dx}{\left(e^{x}+e^{\frac{\pi}{4}}\right)(\sin x+\cos x)} = k\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sec x dx$, then the value of k is (a) $\frac{1}{2}$

(b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{2\sqrt{2}}$ (d) $-\frac{1}{\sqrt{2}}$

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643. If $f(x) = \frac{e^{x}}{1+e^{x}}$, $I_1 = \int_{f(-a)}^{f(a)} xg(x(1-x))dx$, and $I_2 = \int_{f(-a)}^{f(a)} g(x(1-x))dx$, then the value of $\frac{I_2}{I_1}$ is

A. (a) -1

B. (b) -2

C. (c) 2

D. (d) 1

Answer: null

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644. If $f(y) = e^y, g(y) = y > 0, and\ F(t) = \int_0^t f(t - y)g(y)dy$,then

A. (a) $F(t) = e^t - (1 + t)$

B. (b) $F(t) = te^t$

C. (c) $F(t) = te^{-1}$

D. (d) $F(t) = 1 - e^t(1 + t)$

Answer: null

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645. $Given \int_0^{\frac{\pi}{2}} \frac{dx}{1 + \sin x + \cos x} = \log 2.$ Then the value of integral $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1 + \sin x + \cos x} dx$ is equal to (a) $\frac{1}{2}\log 2$ (b) $is \frac{\pi}{2} - \log 2$ $\frac{\pi}{4} - \frac{1}{2}\log 2$ (d) $\frac{\pi}{2} + \log 2$

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646. I f$I_1 = \int_{-100}^{101} \frac{dx}{\left(5 + 2x - 2x^2\right)\left(1 + e^{2-4x}\right)}$

and$I_2 = \int_{-100}^{101} \frac{dx}{5 + 2x - 2x^2}$, $then \frac{I_1}{I_2}$i s (a)2 (b) $\frac{1}{2}$ (c) 1 (d) $-\frac{1}{2}$

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647. $\int_0^{\infty} \frac{xdx}{(1 + x)\left(1 + x^2\right)}$ is equal to (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) π (D) none of these"

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648. $\int_0^{\infty} \frac{dx}{\left[x + \sqrt{x^2 + 1}\right]^3} isequa < o \frac{3}{8}$ (b) $\frac{1}{8}$ (c) $-\frac{3}{8}$ (d) none of these

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649. The value of $\int_1^e \frac{1 + x^2 Inx}{x + x^2 Inx} dx$ is equal (a) $In(1 + e)e + In(1 + e)$ (b) $e - In(1 + e)$

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650. The value of integral $\int_0^{\frac{1}{\sqrt{3}}} \frac{dx}{\left(1+x^2\right)\sqrt{1-x^2}}$ must be (a) $3+2\pi$ (b) $4-\pi 2+\pi$ (c) non of these

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651. $If \int_0^{\infty} \frac{x^2 dx}{\left(x^2+a^2\right)\left(x^2+b^2\right)\left(x^2+c^2\right)} = \frac{\pi}{2(a+b)(b+c)(c+a)}$ then the value of $\int_0^{\infty} \frac{dx}{\left(x^2+4\right)\left(x^2+9\right)}$ (a) $\frac{\pi}{60}$ (b) $\frac{\pi}{20}$ (c) $\frac{\pi}{40}$ (d) $\frac{\pi}{80}$

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652. The value of the integral $\int_0^1 \frac{dx}{x^2+2x\cos\alpha+1}$ is equal to (a)$\sin\alpha$ (b) $\alpha\sin\alpha$ (c)$\frac{\alpha}{2\sin\alpha}$ (d) $\frac{\alpha}{2}\sin\alpha$

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653. Determine a positive integer $n \leq 5$ such that $\int_0^1 e^x(x-1)^n = 16 - 6e$

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654. Let f be a continuous function on $[a, b]$. Prove that there exists a number $x \in [a, b]$ such that $\int_a^x f(t)dx = \int_x^b f(t)dt$.

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655. If $f(x) = \begin{cases} 1 - |x| & |x| \leq 1 \\ 0 & |x| > 1 \end{cases}$ and $g(x) = f(x-1) + f(x+1)$, then find the value of $\int_{-3}^{5} g(x)dx$.

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656. Evaluate: $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right)dx$

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657. Evaluate: $\int_0^{\frac{\pi}{4}} \left(\tan^{-1} \left(\frac{2\cos^2\theta}{2 - \sin 2\theta} \right) \right) \sec^2\theta d\theta.$

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658. $Let\ f(n) = 1 + \frac{1}{2} + \frac{1}{3} + \ldots + \frac{1}{n}.$ Then show that $f(n) = \int_0^{\frac{\pi}{2}} \cot\left(\frac{\theta}{2}\right)\left(1 - \cos^n\theta\right) d\theta$

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659. Let $f(x)$ be a continuous function $\forall x \in R,$ except at $x = 0,$ such that $\int_0^a f(x)dx, a \in R^+$ exists. If $g(x) = \int_x^a \frac{f(t)}{t} dt,$ prove that $\int_0^a f(x)dx = \int_0^a g(x)dx$

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660. If $f(x) = \frac{\sin x}{x} \forall x \in (0, \pi]$, prove that $\frac{\pi}{2}\int_0^{\frac{\pi}{2}} f(x) f\left(\frac{\pi}{2} - x\right) dx = \int_0^{\pi} f(x) dx$

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661. Determine a positive integer n such that $\int_0^{\frac{\pi}{2}} x^n \sin x dx = \frac{3}{4}\left(\pi^2 - 8\right)$

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662. f, g, h are continuous in $[0, 1]$, $f(a - x) = f(x)$, $g(a - x) = -g(x)$, $3h(x) - 4h(a - x) = 5$. Then prove that $\int_0^a f(x) g(x) h(x) dx = 0$.

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663. If $f(x + f(y)) = f(x) + y \forall x, y \in R$ and $f(0) = 1$, then prove that $\int_0^2 f(2 - x) dx = 2\int_0^1 f(x) dx$.

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664. Let $f(x) = (1 - x)^2 \sin^2 x + x^2$ for all x $\in$ R, and let $g(x) = \int \left(\frac{2(t-1)}{t+1} - \ln t \right) f(t) dt$ for t $\in$ [1, x] for all x $\in$ (1, ∞).Which of the following is true ?

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665. Evaluate: $\int_3^{10} [\log[x]] dx$

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666. If the function $f: [0, 8] \to R$ is differentiable, then for $0 < \alpha < 1 < \beta < 2$, $\int_0^8 f(t) dt$ is equal to (a) $3\left[\alpha^3 f\left(\alpha^2\right) + \beta^2 f\left(\beta^2\right)\right]$ (b) $3\left[\alpha^3 f(\alpha) + \beta^2 f(\beta)\right]$ (c) $3\left[\alpha^3 f\left(\alpha^2\right) + \beta^2 f\left(\beta^3\right)\right]$ (d) $3\left[\alpha^2 f\left(\alpha^3\right) + \beta^2 f\left(\beta^3\right)\right]$

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667. The value of $\int_0^1 \frac{x^4(1-x)^4}{1+x^2}dx$ is/are (a) $\frac{22}{7} - \pi$ (b) $\frac{2}{105}$ (c)0 (d) $\frac{71}{15} - \frac{3\pi}{2}$

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668. Let $\int_x^{x+p} f(t)dt$ be independent of $x and I_1 = \int_0^p f(t)dt, I_2 = \int_{10}^{p^n+10} f(z)dz$ for some $p,$ where $n \in N$ Then evaluate $\frac{l_2}{l_1}$.

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669. Evaluate: $\int_{-\pi}^{\pi} \left((2x) \frac{1+\sin x}{1+\cos^2 x} \right) dx$

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670. Q. if $\int_0^{100} (f(x)dx = a,$ then $\sum_{r=1}^{100} \left(\int_0^1 (f(r-1+x)dx) \right) =$

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671. Let $f(x)$ be a derivable function satisfying $f(x) = \int_0^x e^t \sin(x - t)dt and g(x) = f'(x) - f(x)$ Then the possible integers in the range of $g(x)$ is_____

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672. If $\int_0^1 e^{x^2}(x - \alpha)dx = 0$, then (a)$\alpha < 2$ (b)$\alpha < 0$ $(c)0 < \alpha < 1$ (d) $\alpha = 0$

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673. $\int_{\frac{5}{2}}^{5} \frac{\sqrt{\left(25 - x^2\right)^3}}{x^4} dx$ is equal to

A. (a) $\frac{\pi}{6}$

B. (b) $\frac{2\pi}{3}$

C. (c) $\frac{5\pi}{6}$

D. (d) $\frac{\pi}{3}$

Answer: null

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674. The value of $\int_0^{\frac{3\pi}{2}} \frac{\left|\tan^{-1}\tan x\right| - \left|\sin^{-1}\sin x\right|}{\left|\tan^{-1}\tan x\right| + \left|\sin^{-1}\sin x\right|} dx$ is equal to

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675. Let $f(0) = 0 and \int_0^2 f'(2t)e^{f(2t)} dt = 5. then value of f(4) is$ log 2 (b) log 7 (c) log 11 (d) log 13

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676. The value of the integral $\int_0^\infty \frac{x\log x}{\left(1+x^2\right)^2} dx, is$ (a)0 (b) log 7 (c) 5 log 13 (d) none of these

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677. $\int_0^{\pi} \frac{x\tan x}{\sec x + \cos x} dx is \frac{\pi^2}{4}$ (b) $\frac{\pi^2}{2}$ (c) $\frac{3\pi^2}{2}$ (d) $\frac{\pi^2}{3}$

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678. $If \int_{\log 2}^{x} \frac{dx}{\sqrt{e^x - 1}} = \frac{\pi}{6}$, then x is equalto 4 (b) 1n 8 (c) 1n 4 (d) none of these

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679. The solution for x of the equation $\int_{\sqrt{2}}^{x} \frac{dt}{t\sqrt{t^2 - 1}} = \frac{\pi}{2}$ is π (b) $\frac{\sqrt{3}}{2}$ (c) $2\sqrt{2}$ (d) none of these

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680. Which of the following is incorrect? $\int_{a+c}^{b+c} f(x)dx = \int_a^b f(x+c)dx$ $\int_{ac}^{bc} f(x)dx = c\int_a^b f(cx)dx$ $\int_{-a}^{a} f(x)dx = \frac{1}{2}\int_{-a}^{a}(f(x) + f(-x)dx$ None of these

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681. The value f the integral $\int_{-\pi}^{\pi} \sin mx \sin nx dx,$ for $m \neq n(m, n \in I), is$ 0 (b) π (c) $\frac{\pi}{2}$ (d) 2π

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682. $\int \frac{e^x\left(2-x^2\right)}{(1-x)\sqrt{1-x^2}} dx$ is equal to

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683. $\int_0^\infty \left(\frac{\pi}{1+\pi^2x^2} - \frac{1}{1+x^2}\right)\log x dx$ is equal to (a) $-\frac{\pi}{2}\log\pi$ (b) 0 (c) $\frac{\pi}{2}\log 2$ (d) none of these

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684. If $f(x) = \cos\left(\tan^{-1}x\right)$, then the value of the integral $\int_0^1 xf'(x)dx$ is (a) $\frac{3-\sqrt{2}}{2}$ (b) $\frac{3+\sqrt{2}}{2}$ 1 (d) $1 - \frac{3}{2\sqrt{2}}$

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685. The equation of the curve is $y = f(x)$. The tangents at $[1, f(1), [2, f(2)], and[3, f(3)]$ make angles $\frac{\pi}{6}, \frac{\pi}{3}, and\frac{\pi}{4}$, respectively, with the positive direction of x-axis. Then the value of $\int_2^3 f'(x)f^x dx + \int_1^3 f^x dx$ is equal to (a)$-\frac{1}{\sqrt{3}}$ (b) $\frac{1}{\sqrt{3}}$ (c)0 (d) none of these

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686. The value of $\int_1^e \left(\frac{\tan^{-1}x}{x} + \frac{\log x}{1+x^2}\right)dx$, is (a) $\tan e$ (b) $\tan^{-1}e$ (c)$\tan^{-1}\left(\frac{1}{e}\right)$ (d) none of these

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687. If $f(\pi) = 2\int_0^{\pi}\left(f(x) + f^x\right)\sin x dx = 5$, then $f(0)$ is equal to (it is given that $f(x)$ is continuous in $[0, \pi]$). (a) 7 (b) 3 (c) 5 (d) 1

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688. If $\int_1^2 e^{x^2} dx = a, then \int_e^{e^4} \sqrt{1nx} dx$ is equal to (a)$2e^4 - 2e - a$ (b) $2e^4 - e - a$ (c)$2e^4 - e - 2a$ (d) $e^4 - e - a$

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689. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{e^{|\sin x|}\cos x}{1 + e^{\tan x}} dx$ is equal to (a) $e + 1$ (b) $1 - e$ (c) $e - 1$ (d) none of these

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690. The value of the expression $\frac{\int_0^a x^4\left(\sqrt{a^2 - x^2}\right)}{\int_0^a x^2\left(\sqrt{a^2 - x^2}\right)}dx$ is

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691. $IfA = \int_0^{\pi}\frac{\cos x}{(x+2)^2}dx, then\int_0^{\frac{\pi}{2}}\frac{\sin 2x}{x+1}dx$ is equal to (a)$\frac{1}{2} + \frac{1}{\pi + 2} - A$ (b) $\frac{1}{\pi + 2} - A$ (c)$1 + \frac{1}{\pi + 2} - A$ (d) $A - \frac{1}{2} - \frac{1}{\pi + 2}$

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692. $\int_0^4 \frac{\left(y^2 - 4y + 5\right)\sin(y - 2)dy}{\left[2y^2 - 8y + 11\right]}$ is equal to (a) 0 (b) 2 (c) -2 (d) none of these

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693. The values of a for which the integral $\int_0^2 |x - a| dx \geq 1$ is satisfied are (a) $(2, \infty)$ (b) $(-\infty, 0)$ (c)$(0, 2)$ (d) none of these

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694. evaluate: $I = \int \frac{2x}{(x^2 + 1)(x^2 + 3)} dxis$

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695. Let $I = \int_1^3 \sqrt{3 + x^3} dx$, then the value of I will lie in the interval (a)$[4, 6]$ (b) $[1, 3]$ (c)$\left[4, 2\sqrt{30}\right]$ (d) $\left[\sqrt{15}, \sqrt{30}\right]$

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696. $If \int_a^b |\sin x| dx = 8 and \int_0^{a+b} |\cos x| dx = 9, then$

(a) $a + b = \frac{9\pi}{2}$

(b) $|a - b| = 4\pi$

(c) $\frac{a}{b} = 15$

(d) $\int_a^b \sec^2 x dx = 0$

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697. If $f(x) = \{0$,where $x = \frac{n}{n+1}, n = 1, 2, 3....$ and 1 else where then the value of $\int_0^2 f(x)dx$ is

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698. The function f and g are positive and continuous. If f is increasing and g is decreasing, then $\int_0^1 f(x)[g(x) - g(1 - x)]dx$

(a)is always non-positive

(b)is always non-negative

(c)can take positive and negative values

(d)none of these

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699. A Function $f(x)$ satisfies the relation $f(x) = e^x + \int_0^1 e^x f(t)dt$. Then (a) $f(0) < 0$ (b)$f(x)$ is a decreasing function. (c)$f(x)$ is an increasing function. (d)$\int_0^1 f(x)dx > 0$

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700. Let $f(x)$ be positive, continuous, and differentiable on the interval $(a, b) and \lim_{x \to a^+} f(x) = 1, \lim_{x \to b^-} f(x) = 3^{\frac{1}{4}}$. If $f'(x) \geq f^3(x) + \frac{1}{f(x)}$, then the greatest value of $b - a$ is (a)$\frac{\pi}{48}$ (b) $\frac{\pi}{36}$ (c)$\frac{\pi}{24}$ (d) $\frac{\pi}{12}$

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701. Let$f: (0, \infty) \to R$ and$F\left(x^3\right) = \int_0^3 f(t)dt$, if $F\left(x^3\right) = x^3\left(x^2 + x + 1\right)$ .Then f(27)=

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702. If $g(x) = \int_0^x 2|t|dt$, then (a) $g(x) = x|x|$ (b) $g(x)$ is monotonic (c) g(x) is differentiable at x=0 (d) $g'(x)$ is differentiable at x=0

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703. Prove that the value of the integral, $\int_0^{2a} \frac{f(x)}{f(x) + f(2a - x)} dx$ is equal to a.

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704. Let $f: \left[\frac{1}{2}, 1\right] \to R$ (the set of all real numbers) be a positive, non-constant, and differentiable function such that $f'(x) < 2f(x) and f\left(\frac{1}{2}\right) = 1$. Then the value of $\int_{\frac{1}{2}}^{1} f(x)dx$ lies in the interval (a) $(2e - 1, 2e)$ (b) $(3 - 1, 2e - 1)$ (c) $\left(\frac{e - 1}{2}, e - 1\right)$ (d) $\left(0, \frac{e - 1}{2}\right)$

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705. Let f be a real-valued function defined on the inverval $(-1, 1)$ such that $e^{-x}f(x) = 2 + \int_0^x \sqrt{t^4 + 1}dt$, for all, $x \in (-1, 1) and let f^{-1}$ be the inverse function of f Then $\left(f^{-1}\right)'(2)$ is equal to (a) 1 (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{e}$

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706. $\int_{-\frac{1}{\sqrt{3}}}^{-\frac{1}{\sqrt{3}}} \frac{x^4}{1 - x^4} \cos^{-1}\left(\frac{2x}{1 + x^2}\right) dx$

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707. The value of $\int_{\sqrt{\ln 2}}^{\sqrt{\ln 3}} \frac{x \sin x^2}{\sin x^2 + \sin\left(\ln 6 - x^2\right)} dx$ is (A) $\frac{1}{4}\ln\left(\frac{3}{2}\right)$ (B) $\frac{1}{2}\ln\left(\frac{3}{2}\right)$ (C) $\ln\left(\frac{3}{2}\right)$ (D) $\frac{1}{6}\ln\left(\frac{3}{2}\right)$

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708. Let f be a non-negative function defined on the interval $[0, 1]$. If $\int_0^x \sqrt{1 - \left(f'(t)\right)^2} dt = \int_0^x f(t)dt, 0 \leq x \leq 1, and\ f(0) = 0$, then

A. (A)$f\left(\frac{1}{2}\right) < \frac{1}{2}\ and\ f\left(\frac{1}{3}\right) > \frac{1}{3}$

B. (B)$f\left(\frac{1}{2}\right) > \frac{1}{2}\ and\ f\left(\frac{1}{3}\right) > \frac{1}{3}$

C. (C)$f\left(\frac{1}{2}\right) < \frac{1}{2}\ and\ f\left(\frac{1}{3}\right) < \frac{1}{3}$

D. (D)$f\left(\frac{1}{2}\right) > \frac{1}{2}\ and\ f\left(\frac{1}{3}\right) < \frac{1}{3}$

Answer: null

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709. $(\lim)_{n \to \infty} \frac{n}{2^n} \int_0^2 x^n dx$ equals___

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710. Let $f:[0,\infty) \to R$ be a continuous strictly increasing function, such that $f^3(x) = \int_0^x tf^{.2}(t)dt$ for every $x \geq 0$. Then value of $f(6)$ is_____

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711. A continuous real function f satisfies $f(2x) = 3\left(f(x)\forall x \in RIf\int_0^{\dot{1}} f(x)dx = 1,\right.$ then find the value of $\int_1^2 f(x)dx$

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712. $Letf(x) = x^3 - \frac{3x^2}{2} + x + \frac{1}{4}$ Then the value of $\left(\int_{\frac{1}{4}}^{\frac{3}{4}} f(f(x))dx\right)^{-1}$ is____

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713. Consider the polynomial $f(x) = ax^2 + bx + \cdot$ If $f(0) = 0, f(2) = 2,$ then the minimum value of $\int_0^2 \left|f'(x)\right| dxis$ __

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714. Column I, Column II If $f(x)$ is an integrable function for $x \in \left[\frac{\pi}{6}, \frac{\pi}{3}\right] and$ $I_1 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sec^2\theta f(2\sin 2\theta) dth\eta, and$ $I_2 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} c o s e c^2\theta f(2\sin 2\theta) dth\eta, then \frac{I_1}{I_2} =$, p. 3 If $f(x+1) = f(3+x) \forall x,$ and the value $of \int_a^{a+b} f(x) dx isindependen \rightarrow fa,$ then the value of b can be, q. 1

The value of $\int_0^1 \frac{\tan^{-1}\left[x^2\right]}{\tan^{-1}\left[x^2\right] + \tan^{-1}\left[25 + x^2 - 10x\right]}$, r. 2 $(d) IfI \int_0^2 \sqrt{x + \sqrt{x + \sqrt{x + \infty}}} dx (wherex > 0), then[I]$ is equal to (where [.] denotes the greatest integer function), s. 4

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715. STATEMENT 1: If $f(x)$ is continuous on $[a, b]$, then there exists a point $c \in (a, b)$ such that $\int_a^b f(x) dx = f(c)(b - a)$

STATEMENT 2: For $a < b,$ if $mandM$ are, respectively, the smallest and greatest values of $f(x) on[a, b]$, then $m(b - a) \leq \int_a^b f(x) dx \leq (b - a)M$

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716. The value of the definite integral, $\int_0^{\frac{\pi}{2}} \frac{\sin 5x}{\sin x} dx$ is

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717. The value of $\int_0^{\pi} \frac{\sin\left(n + \frac{1}{2}\right)x}{\sin\left(\frac{x}{2}\right)} dx$ is, (a) $n \in I, n \geq 0 \frac{\pi}{2}$ (b) 0 (c) π (d) 2π

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718. $If I(m, n) = \int_0^1 x^{m-1}(1-x)^{n-1} dx, (m, n \in I, m, n \geq 0), then$ (a) $I(m, n) = \int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m-n}} dx$ (b) $I(m, n) = \int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx$ (c) $I(m, n) = \int_0^{\infty} \frac{x^{n-1}}{(1+x)^{m+n}} dx$ (d) $I(m, n) = \int_0^{\infty} \frac{x^{n}}{(1+x)^{m+n}} dx$

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719. If $I_n = \int_0^{\sqrt{3}} \frac{dx}{1+x^n}, (n = 1, 2, 3..),$ then find the value of $(\lim)_{n \to \infty} I_n$.

(a) 0 (b) 1 (c) 2 (d) $\frac{1}{2}$

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720. $\int_0^1 \frac{\tan^{-1}x}{x} dx$ is equals to (a) $\int_0^{\frac{\pi}{2}} \frac{\sin x}{x} dx$ (b) $\int_0^{\frac{\pi}{2}} \frac{x}{\sin x} dx$ (c) $\frac{1}{2}\int_0^{\frac{\pi}{2}} \frac{\sin x}{x} dx$ (d) $\frac{1}{2}\int_0^{\frac{\pi}{2}} \frac{x}{\sin x} dx$

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721. If $\int_0^1 \frac{\sin t}{1+t} dt = \alpha,$ then the value of the integral $\int_{4\pi-2}^{4\pi} \frac{\sin\left(\frac{t}{2}\right)}{4\pi+2-t} dt$ is (1) 2α (2) -2α (3) α (4) $-\alpha$

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722. $LetI_1 = \int_0^1 \frac{e^x dx}{1+x} andI_2 = \int_0^1 \frac{x^2 dx}{e^{x^3}\left(2 - x^3\right)} \cdot tehn \frac{I_1}{I_2} isequal \rightarrow$ (a)3/e(*b*)e/3(*c*) 3e(*d*)1/(3e)`

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723. $\int_{\sin\theta}^{\cos\theta} f(x\tan\theta)dx \left(where\theta \neq \frac{n\pi}{2}, n \in I\right)\Bigg)$ is equal to (a) $-\cos\theta\int_1^{\tan\theta} f(x\sin\theta)dx$ (b)$-\tan\theta\int_{\cos\theta}^{\sin\theta} f(x)dx$ (c)$\sin\theta\theta\int_1^{\tan\theta} f(x\cos\theta)dx$ (d) $\frac{1}{\tan\theta}\theta\int_{\sin\theta}^{\sin\theta\tan\theta} f(x)dx$

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724. Let $g(x) = \int_0^x f(t).\, dt$,where f is such that $\frac{1}{2} \leq f(t) \leq 1$ for $t \in [0, 1]$ and $0 \leq f(t) \leq \frac{1}{2}$ for $t \in [1, 2]$.Then g(2) satisfies the inequality

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725. The value of $\int_0^{\frac{\pi}{2}} \sin|2x - \alpha|dx$, where $\alpha \in [0, \pi]$, is (a) $1 - \cos\alpha$ (b) $1 + \cos\alpha$ (c) 1 (d) $\cos\alpha$

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726. $If I_n = \int_0^{\pi} e^x (\sin x)^n dx$, $then \frac{I_3}{I_1}$ is equal to $\frac{3}{5}$ (b) $\frac{1}{5}$ (c) 1 (d) $\frac{2}{5}$

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727. $\int_{-2}^{0} \left\{(x + 1)^3 + 2 + (x + 1)\cos(x + 1)dx\right.$ is equal to (A) -4 (B) 0 (C) 4 (D) 6

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728. For any real number x, let $[x]$ denote the largest integer less than or equal to x, Let f be a real-valued function defined on the interval $[-10, 10]$

be $f(x) = \{x - [x], \quad \text{if} \quad [x] \text{ is odd}, 1 + [x] - x, \quad \text{if} \quad [x] \text{ is even}$ Then the value of $\frac{\pi^2}{10}\int_{-10}^{10} f(x)\cos\pi x dx$ is____

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729. evaluate: $\int_0^{\frac{\pi}{4}} 2\tan^3 x dx is$

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730. If f is continuous function and $F(x) = \int_0^x \left((2t + 3) \cdot \int_t^2 f(u)du\right)dt,$ then $\left|\frac{F''(2)}{f(2)}\right|$ is equal to_____

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731. Let $f'(x) = \frac{192x^3}{2 + \sin^4 \pi x} f \text{ or } all x \in R with f\left(\frac{1}{2}\right) = 0. If m \leq \int_{\frac{1}{2}}^{1} f(x)dx \leq M,$ then the possible values of $m and M$ are (a)$m = 13, M = 24$ (b) $m = \frac{1}{4}, M = \frac{1}{2}$ (c)$m = -11, M = 0$ (d) $m = 1, M = 12$

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732. If the value of $\lim_{n \to \infty} \left(n^{-\frac{3}{2}}\right) \sum_{j=1}^{6n} \sqrt{j}$ is equal to $\sqrt{N}$, then the value of $\frac{N}{12}$ is _____

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733. $f(x) = \int_0^x f(t)dt = x + \int_x^1 tf(t)dt,$ then the value of $f(1)$ is

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734. If $I = \int_0^{\frac{3\pi}{4}} [(1 + x)\sin x + (1 - x)\cos x]dx,$ then value of $\left(\sqrt{2} - 1\right)I$ is_____

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735. The value of $\int_1^a [x]f'(x)dx$,where $a > 1$, and $[x]$ denotes the greatest integer not exceeding x, is

(A) $af(a) - \{f(1)f(2) + \ldots . + f([a])\}$

(B) $[a]f(a) - \{f(1) + f(2) + \ldots\ldots + f([a])\}$

(C) $[a]f(a) - \{f(1) + f(2) + \ldots\ldots + fA\}$

(D) $af([a]) - \{f(1) + f(2) + \ldots\ldots + fA\}$

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736. The value of $\int_0^x [\cos t]dt, x\varepsilon\left[(4n+1)\frac{\pi}{2}, (4n+3)\frac{\pi}{2}\right]$ and $n\varepsilon N$ is equal to (where [.] represents greatest integer function.

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737. Let $f(x) = \min(\{x\}, \{-x)\forall\varepsilon R$, where {.} denotes the fractional part of x. Then $\int_{-100}^{100} f(x)dx$ is equal to

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738. $\int_1^4 (x - 0.4)dx$ equals (where $\{x\}$ is a fractional part of (x)

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739. The value of the definite integral $\int_2^4 (x(3 - x)(4 + x)(6 - x)(10 - x) + \sin x)dx$ equal (a)$\cos 2 + \cos 4$ (b) $\cos 2 - \cos 4$ (c)$\sin 2 + \sin 4$ (d) $\sin 2 - \sin 4$

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740. $If x = \int_c^{\sin t} \sin^{-1} z dz, y = \int_k^{\sqrt{t}} \frac{\sin z^2}{z} dz, then \frac{dy}{dx} is\ equals$

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741. If $f(x) = \int_0^1 \frac{dt}{1 + |x - t|}$,then $f'\left(\frac{1}{2}\right)$ is equal to (a)0 (b) $\frac{1}{2}$ (c) 1 (d) none of these

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742. Let $f(x) = \int_2^x \frac{dt}{\sqrt{1+t^4}}$ and g be the inverse of f. Then, the value of $g'(0)$ is

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743. STATEMENT 1: $\int_0^{\frac{\pi}{4}} \log(1 + tan\theta)d\theta = \frac{\pi}{8}\log 2.$ STATEMENT 2: $\int_0^{\frac{\pi}{2}} \log\sin\theta d\theta = -\pi\log 2.$

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744. STATEMENT 1:$f(x)$ is symmetrical about $x = 2$. Then $\int_{2-a}^{2+a} f(x)dx$ is equal to $2\int_2^{2+a} f(x)dx$. STATEMENT 2: If $f(x)$ is symmetrical about $x = b$, then $f(b - \alpha) = f(b + \alpha) \forall \alpha \in R$.

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745. If $f(x) = \cos x - \int_0^x (x - t)f(t)dt, then f''(x) + f(x)$ is equal to (a)$-\cos x$ (b) $-\sin x$ (c)$\int_0^x (x - t)f(t)dt$ (d) 0

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746. If $f'(x) = f(x) + \int_0^1 f(x)dx, given f(0) = 1,$ then the value of $f\left((\log)_e 2\right)$ is (a)$\frac{1}{3 + e}$ (b) $\frac{5 - e}{3 - e}$ (c)$\frac{2 + e}{e - 2}$ (d) none of these

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747. STATEMENT 1: $\int_0^\pi \sqrt{1 - \sin^2 x}dx = 0$, STATEMENT 2: $\int_0^\pi \cos x dx = 0$

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748. STATEMENT 1: Let m be any integer. Then the value of $I_m = \int_0^\pi \frac{\sin 2mx}{\sin x}dx$ is zero.

STATEMENT 2 : $I_1 = I_2 = I_3 = \ = I_m$

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749. STATEMENT 1: The value of $\int_0^{2\pi} \cos^{99} x dx$ is 0 STATEMENT 2: $\int_0^{2a} f(x)dx = 2\int_0^{a} f(x)dx$,if $f(2a - x) = f(x)$

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750. For $a \varepsilon R$ (the set of all real numbers) $a \neq -1$, $\lim_{n \to \infty} \frac{\left(1^a + 2^a + \ldots\ldots\ldots + n^a\right)}{(n+1)^{a-1}[(na+1) + (n+2) + \ldots\ldots\ldots\ldots + (na+n)]} = \frac{1}{60}$

Then $a =$

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751. Let S be the area of the region enclosed by $y - e^{-x^2}, y = 0, x = 0$ and $x = 1$. Then

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752. Let $f:(0,\infty)\vec{R}$ be given by $f(x)=\int_{\frac{1}{x}}^{x}\frac{e^{-\left(t+\frac{1}{t}\right)}dt}{t}$, then (a)$f(x)$ is monotonically increasing on $[1,\infty)$ (b)$f(x)$ is monotonically decreasing on $(0,1)$ (c)$f\left(2^{x}\right)$ is an odd function of x on R (d) none of these.

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753. Show that $\int_{0}^{\pi}xf(\sin x)dx=\frac{\pi}{2}\int_{0}^{\pi}f(\sin x)dx$.

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754. Let $f(x)$ be a non-constant twice differentiable function defined on $(-\infty,\infty)$ such that $f(x)=f(1-x)andf'\left(\frac{1}{4}\right)=0$. Then

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755. Let $f(x) = \int_2^x \frac{dt}{\sqrt{1+t^4}} and g(x)$ be the inverse of $f(x)$. Then the value of $g'(0)$

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756. Let f be a real-valued function defined on interval $(0, \infty)$,by $f(x) = \ln x + \int_0^x \sqrt{1+\sin t}.\, dt$. Then which of the following statement(s) is (are) true? (A). f"(x) exists for all $\in (0, \infty)$. (B). f'(x) exists for all x $\in (0, \infty)$ and f' is continuous on $(0, \infty)$, but not differentiable on $(0, \infty)$. (C). there exists $\alpha > 1$ such that $|f'(x)| < |f(x)|$ for all x $\in (\alpha, \infty)$. (D). there exists $\beta > 1$ such that $|f(x)| + |f'(x)| \leq \beta$ for all x $\in (0, \infty)$.

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757. Let $f: R \to R$ be a continuous odd function, which vanishes exactly at one point and $f(1) = \frac{1}{2}$. Suppose that $F(x) = \int_{-1}^x f(t)dt$ for all $x \in [-1, 2]$

and $G(x) = \int_{-1}^{x} t|f(f(t))|dt$ for all $x \in [-1, 2]$. If $\lim_{x \to 1} \frac{F(x)}{G(x)} = \frac{1}{14}$, Then the value of $f\left(\frac{1}{2}\right)$ is

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758. If the value of the definite integral $\int_0^1 \frac{\sin^{-1}\sqrt{x}}{x^2 - x + 1} dx$ is $\frac{\pi^2}{\sqrt{n}}$ (where $n \in N$), then the value of $\frac{n}{27}$ is

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759. Let $f(x) = 7\tan^8 x + 7\tan^6 x - 3\tan^4 x - 3\tan^2 x$ for all $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. Then the correct expression (s) is (are) (a) $\int_0^{\frac{\pi}{4}} xf(x)dx = \frac{1}{12}$ (b) $\int_0^{\frac{\pi}{4}} f(x)dx = 0$ (c) $\int_0^{\frac{\pi}{4}} xf(x) = \frac{1}{6}$ (d) $\int_0^{\frac{\pi}{4}} f(x)dx = \frac{1}{12}$

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760. The option(s) with the values of a and L that satisfy the following equation is (are) $\frac{\int_0^{4\pi} e^t\left(\sin^6 at + \cos^4 at\right)dt}{\int_0^{\pi} e^t\left(\sin^6 at + \cos^4 at\right)dt} = L$

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761. Let $f: R\vec{R}$ be a function defined by $f(x) = \{[x], (x \leq 2)\ \ (0, x > 2)$ where $[x]$ is the greatest integer less than or equal to $\dot{x}$ If $I = \int_{-1}^{2} \frac{xf\left(x^2\right)}{2 + f(x+1)} dx$, *then the value of* $(4I - 1)$*is*

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762. Prove that $\int_0^1 \tan^{-1}\left(\frac{1}{1 - x + x^2}\right)dx = 2\int_0^1 \tan^{-1} x dx$. Hence or otherwise, evaluate the integral $\int_0^1 \tan^{-1}\left(1 - x + x^2\right)dx$

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763. Let $f(x) = \begin{vmatrix} \sec x & \cos x & \sec^2 x + \cot x \operatorname{cosec} x \\ \cos^2 x & \cos^2 x & \operatorname{cosec}^2 x \\ 1 & \cos^2 x & \cos^2 x \end{vmatrix}$ then, $\int_{-\pi}^{\pi} f(x) dx equals$

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764. If $f(x) = \int_a^x [f(x)]^{-1} dx$ and $\int_a^1 [f(x)]^{-1} dx = \sqrt{2}$, then

A. (a) $f(2) = 2$

B. (b) $f'(2) = \frac{1}{2}$

C. (c) $f'(2) = 2$

D. (d) $\int_0^1 f(x) dx = \sqrt{2}$

Answer: null

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