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India's Number 1 Education App

MATHS

JEE (MAIN AND ADVANCED MATHEMATICS) FOR BOARD AND COMPETITIVE EXAMS

INTEGRALS

Example

1. Write an anti-derivative for each of the following function using method of inspection :

$(i)\cos 3x \ (ii)3x^2 + 5x^4$

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2. Find following integrals

$(i) \int \frac{x^5 - 2}{x^4} dx$

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

$(iii) \int \cos ecx \{\cos ecx - \cot x\} dx$

$(iv) \int \frac{1 + \sin x}{\cos^2 x} dx$

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3. Integrate the following functions w.r.t.x ,

$(i) \int (ax + b)^n dx \; (ii) \int \frac{2^{\frac{1}{x}}}{x^2} dx$

$(iii) \int \frac{2dx}{(e^x + e^{-x})^2}$

$(iv) \frac{1}{x^2 (x^4 + 1)^{\frac{3}{4}} dx}$

$(v) \int \frac{(\tan^{-1} x)^3}{1 + x^2} dx$

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4. Integrate following w.r.t.x, $\sin^5 x \cos^4 x dx$.

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5. Evaluate: $\int \frac{\sin^4 x}{\cos^8 x}\, dx$

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6. Integrate the following function w.r.t.x

$(i) f(x) = \sin x \cos 3x$

$(ii) f(x) = \sin^3 x$

$(iii) f(x) = \frac{\sin x}{\sin(x - \alpha)}$

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7. Integrate following function w.r.t.x

$(i) \int \frac{dx}{9 + x^2}$ $(ii) \int \frac{dx}{\sqrt{a^2 - 4x^2}}$

$(iii) \int \frac{\sqrt{x} dx}{\sqrt{a^3 - x^3}}$

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8. Find the following integrals

$(i)\int\frac{1}{x^2+2x+2}dx\ (ii)\int\frac{1}{3x^2+13x-10}dx$

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9. Integrate the following integrals

$(i)\int\frac{dx}{\sqrt{5x^2-2x}}\ (ii)\int\frac{1}{\sqrt{2ax-x^2}}dx$

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

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11. Evaluate the inetgral, $\int\frac{4x+1}{\sqrt{x^2+3x+2}}dx$

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12. Evaluate: $\int \frac{x^2+1}{x^2-5x+6}dx$

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13. Find $\int \frac{3x-2}{(x+1)^2(x+3)dx}$

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14. Find : $\int \frac{x}{(x^2+1)(x-1)}dx$

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15. Evaluate following integrals,

$(i) \int \log x dx$

$(ii) \int e^x \cos x dx$

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16. Evaluate following :

$(i) \int e^x \{\sin x + \cos x\} dx$

$(ii) \int e^x \frac{x^2+1}{(x+1)^2} dx$

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17. Evaluate the integral, $\int \sqrt{x^2+2x+6} dx$.

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18. Evaluate $\int_0^1 x^2 dx$ as the limit of a sum.

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19. Evaluate $\int_{\pi/6}^{\pi/4} \operatorname{cosec} x dx$

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20. $\int_0^{\pi/4} \frac{dx}{(1+\cos 2x)}$

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21. Choose the correct answer The value of the integral $\int_{\frac{1}{3}}^{1} \frac{(x-x^3)^{\frac{1}{3}}}{x^4} dx$ is (A) 6 (B) 0 (C) 3 (D) 4

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22. Evaluate $\int_0^4 \frac{e^x}{1+e^{2x}} dx$

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23. Evaluate $-\int_{2\pi}^{0} |\sin x| dx$

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24. Prove that $\int_0^2 |x^2 + 2x - 3| dx = 4$

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25. Evaluate $\int_{-1}^{1} \{x\} dx$, $\{x\}$ is fractional part function.

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26. Evaluate $-\int_{3\pi/2}^{\pi/2} [2 \sin x] dx$, when $[.]$ denotes the greatest integer function.

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27. Evaluate $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \tan^n x}$

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28. Evaluate $\int_0^{\pi/4} \ln(1+\tan x)dx$

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29. Write an anti-derivative for each of the following function using method of inspection :

$(i)\cos 3x \ (ii)3x^2+5x^4$

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30. Evaluate $\int_0^{\pi/2} \ln \sin 2x dx$

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31. Evaluate $\int_{-\pi/4}^{\pi/4} x^3 \sin^2 x dx$

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32. Evaluate : $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x dx$

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33. If the function $f:[-1,1] \to R$ is continuous and even, then show that $\int_0^{\pi/2} f(\cos 2x)\cos x dx = \sqrt{2}\int_0^{\pi/4} f(\sin 2x)\cos x dx.$

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34. Evaluate the following indefinite integrals :

$(i) \int 8\cos x \cos^3 3x dx$

$(ii) \int \frac{x+2005}{(x+2007)^2} dx$

$(iii) \int \frac{x+5}{\sqrt{x-3}} dx$

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35. Evaluate the following indefinite integrals :

$(i)\int\sqrt{a^2-x^2}dx\ (ii)\int\frac{1}{\sqrt{49+x^2}}dx$

$(iii)\int\frac{1}{x\sqrt{x^6-1}}dx\ (iv)\int\sqrt{\frac{1+x}{1-x}}dx$

$(v)\int\sqrt{\frac{x^{2009}}{2x^{2008}-x^{2009}}}dx\ (vi)\int\frac{1}{\sqrt{(x-4)(x-5)}}dx$

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36. Evaluate the following integrals :

$(i)\int\frac{x^2-4}{(x^2+1)(x^2+2)(x^2+3)}dx\ (ii)\int\frac{1}{(x+1)(x^2+1)^2}dx$

$(iii)\int\frac{1}{x^3(x^2+1)^2}dx$

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37. Evaluate the following :

$(i)\int\frac{x+2}{(x+3)(x+4)^{\frac{3}{2}}dx}\ (ii)\int\left(\frac{x+3}{2x+5}\right)^{\frac{1}{2}}\cdot\frac{1}{x}dx$

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38. Evaluate the following integrals :

$(i) \int \frac{2(x+16)^{\frac{1}{2}} + (x+16)^{\frac{3}{4}}}{x(x+16)^{\frac{5}{4}}} dx$

$(ii) \int \frac{1 + x^{\frac{1}{2}} - x^{\frac{2}{3}}}{1 + x^{\frac{1}{3}}} dx$

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39. Evaluate the following integrals :

$(i) \int \frac{1}{(x+1)\sqrt{2x-3}} dx$

$(ii) \int \frac{1}{(x+1)\sqrt{x^2+x-1}} dx$

$(iii) \int \frac{1}{(x^2+3x+3)\sqrt{x+1}} dx$

$(iv) \int \frac{1}{(x^2-3x+2)\sqrt{x^2-2}} dx$

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40. Evaluate the following

$(i) \int x^4 e^{5x} dx \ (ii) \int x^4 \cos 5x dx$

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41. Evaluate the following integrals :

$(i) \int \sin^4 x \cos^2 x dx \ (ii) \int \sec^{\frac{4}{9}} x \cos ec^{\frac{14}{9}} x dx$

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42. Evaluate the following integrals :

$(i) \int \tan^{-5} x \sec^6 x dx \ (ii) \int \cos ec^8 x \cot^3 x dx$

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43. Evaluate the following integrals :

$(i) \int \frac{\cos x}{2 \sin x + 3 \cos x} dx$

$(ii) \int \frac{2 \sin x + \cos x}{7 \sin x - 5 \cos x} dx$,br. $(iii) \int \frac{5 \sin x + 6}{2 \cos x + \sin x + 3} dx$

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44. The value of the integral $\int \frac{\cos^3 x + \cos^5 x}{\sin^2 x + \sin^4 x} dx$ is (A) $\sin x - 6\tan^{-1}(\sin x) + C$ (B) $\sin x - 2(\sin x)^{-1} + C$ (C) $\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x) + C$ (D) $\sin x - 2(\sin x)^{-1} + 5\tan^{-1}(\sin x) + C$

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45. Evaluate the following integral :

$$\int \left(x + \sqrt{a^2 + x^2}\right)^{2007} dx$$

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46. Evaluate the following integral :

$$\int \frac{1}{x^4 + 1} dx$$

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

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48. $\int \left(x^{3m}+x^{2m}+x^m\right)\left(2x^{2m}+3x^m+6\right)^{\frac{1}{m}}dx$

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49. Evaluate

$\int \cot^{-1}\left(x^2+x+1\right)dx$

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50. Evaluate: $\int e^{x\sin x+\cos x}\left\{\frac{x^4\cos^3 x-x\sin x+\cos x}{x^2\cos^2 x}\right\}dx$

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

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52. Evaluate $\int_0^{2\pi} |\cos x| dx$

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53. Evaluate $\int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx.$

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54. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\tan x}}$

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55. Evaluate: $\int_{\pi/4}^{\pi/4} \frac{x+\pi/4}{2-\cos 2x} dx$

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

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57. $I_n = \int_0^{\frac{\pi}{4}} \tan^n x \, dx$, then the value of $n(l_{n-1} + I_{n+1})$ is

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58. Evaluate $\int_0^{\pi} \sin^3 x \cdot \cos^4 x dx$

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59. 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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60. The value of $\lim_{n\to\infty} \sum_{r=1}^{n} \frac{r^2}{r^3+n^3}$ is -

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61. Evaluate $\lim_{n\to\infty} \frac{1}{n}\left[\sin^{2k}.\frac{\pi}{2n} + \sin^{2k}.\frac{2\pi}{2n} + ... + \sin^{2k}.\frac{\pi}{2}\right]$

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Competition level Questions

1. The family of anti-derivatives of $f(x) = \frac{1}{ax^2+2\sqrt{ab}x+b+1}$ is

A. $\frac{1}{2\sqrt{a}}\log\left|\sqrt{a}x+\sqrt{b}\right| + C$

B. $\frac{1}{\sqrt{a}}\tan^{-1}\left(\sqrt{a}x+\sqrt{b}\right)+C$

C. $\sin^{-1}\left(\sqrt{a}x+\sqrt{b}\right)+C$

D. $e^{\sqrt{a}x+\sqrt{b}}+C$

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

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

A. $\frac{2}{7}x^{\frac{7}{2}}+2x^{\frac{3}{2}}+x^{-\frac{1}{2}}+C$

B. $\frac{2}{9}x^{\frac{7}{2}}+\frac{2}{3}x^{\frac{3}{2}}+\sqrt{x}+C$

C. $\frac{2}{5}x^{\frac{5}{2}}+\frac{2}{3}x^{\frac{3}{2}}+2x^{\frac{1}{2}}+C$

D. $\frac{2}{9}x^{\frac{9}{2}}+\frac{6}{5}x^{\frac{5}{2}}+2x^{\frac{1}{2}}+C$

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4. $\int(2^x - 4\cos x + 2)dx$ equals

A. $2^x \log_2 e - 4\sin x + 2x + C$

B. $2^x + 4\sin x + 2x + C$

C. $2^x \log_e 2 + 4\sin x + 2x + C$

D. $e^x \log_2 e + 4\sin x + 2x + C$

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5. $\int x \frac{e^{\tan^{-1} x^2}}{x^4 + 1}$ dx equals

A. $e^{x^2} \tan^{-1} x^2 + C$

B. $\frac{1}{2} e^{\tan^{-1} x^2} + C$

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

D. $\frac{x^2}{2}\log\left(x^2\right) + C$

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6. $\int \frac{dx}{x\left(1 + (\log x)^2\right)}$ equals

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7. Evaluate: (i) $\int (\tan x + \cot x)^2 \, dx$ (ii) $\int \frac{1 - \cos 2x}{1 + \cos 2x} \, dx$

A. $\tan x + \cot x + C$

B. $\sec x + \cos ecx + C$

C. $\tan x - \cot x + C$

D. $\sec x - \cos ecx + C$

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8. $\int \sec^2(3-2x)dx$ equals

A. $\frac{1}{2}\tan(2x-3)+C$

B. $\frac{1}{2}\sec(2x-3)+C$

C. $\frac{1}{2}\cos(3-2x)+C$

D. $\frac{1}{2}\tan(3-2x)+C$

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

A. $\sec x-\tan x+C$

B. $\log|\sec x+\tan x|+C$

C. $\log|\sec x-\tan x|+C$

D. $\sec x + \tan x + C$

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10. If $f'(x) = \sqrt{x}$ and $f(1) = 2$ then $f(x)$ is equal to

A. $\frac{3}{2}x^{\frac{3}{2}}$

B. $\frac{3}{2}x^{\frac{3}{2}} + \frac{4}{3}$

C. $\frac{2}{3}x^{\frac{3}{2}}$

D. $\frac{2}{3}x^{\frac{3}{2}} + \frac{4}{3}$

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11. $\int f(x)dx = 2(f(x))^3 + C$,and $f(0) = 0$ then $f(x)$ is (A) $\frac{x}{2}$ (B) $\frac{x^2}{2}$ (C) $\sqrt{\frac{x}{3}}$ (D) $2\sqrt{\frac{x}{3}}$

A. $\frac{x}{2}$

B. $\sqrt{\frac{x}{3}}$

C. $2\sqrt{\frac{x}{3}}$

D. $\frac{x^2}{2}$

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12. If $f(0) = f'(0) = 0$ and $f''(x) = \tan^2 x$ then f(x) is

A. $\log|\sec x| - \frac{1}{2}x^2$

B. $\log\cos x + \frac{1}{2}x^2$

C. $\log|\sec x| + \frac{1}{2}x^2$

D. $x^4 + x^3 + 1$

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13. $\int\left(\cos.\ \frac{x}{2}-\sin.\ \frac{x}{2}\right)^2 dx$ equals

A. $x+\cos x+C$

B. $2\cos^2.\ \frac{x}{2}+C$

C. $\frac{1}{3}\left(\cos.\ \frac{x}{2}-\frac{x}{2}\right)^3+C$

D. $x-\cos x+C$

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14. $\int\frac{e^{\cos^{-1}x}}{\sqrt{1-x^2}}dx$ eqauls

A. $-e^{\sin^{-1}x}+C$

B. $e^{\tan^{-1}x}+C$

C. $-e^{\cos^{-1}x}+C$

D. $e^{\sec^{-1}x}+C$

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

A. $\frac{1}{b^2}\left[x + \frac{2a}{b}\log|(a+bx)| - \frac{a^2}{b}\frac{1}{(a+bx)}\right] + C$

B. $\frac{1}{b^2}\left[x - \frac{2a}{b}\log|(a+bx)| + \frac{a^2}{b}\frac{1}{(a+bx)}\right] + C$

C. $\frac{1}{b^2}\left[x + \frac{a}{b} - \frac{2a}{b}\log|(a+bx)| - \frac{a^2}{b}\frac{1}{(a+bx)}\right] + C$

D. $\frac{1}{b^2}\left[x + \frac{a}{b} + \frac{2a}{b}\log|(a+bx)| + \frac{a^2}{b}\frac{1}{(a+bx)}\right] + C$

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

A. $\frac{1}{2}\log\left|\tan\left(\frac{x}{2} + \frac{\pi}{12}\right)\right| + C$

B. $\frac{1}{2}\log\left|\tan\left(\frac{x}{2} - \frac{\pi}{12}\right)\right| + C$

C. $\log\left|\tan\left(\frac{x}{2} + \frac{\pi}{12}\right)\right| + C$

D. $\log\left|\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)\right|+C$

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17. $\int\frac{a^{\sqrt{x}}}{\sqrt{x}}$ dx equals

A. $2a^{\sqrt{x}}\log_e a+C$

B. $2a^{\sqrt{x}}\log_a e+C$

C. $2a^{\sqrt{x}}\log_{10} a+C$

D. $2a^{\sqrt{x}}\log_a 10+C$

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18. If $\int\sin 3x\cos 5xdx=0$ when $x=0$, then the value of constant of integration

A. $\frac{1}{16}$

B. $-\frac{1}{16}$

C. $\frac{3}{16}$

D. $-\frac{3}{16}$

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19. If $f(x) = \int \frac{x^2 + \sin^2 x}{1 + x^2} \sec^2 x dx$ and $f(0) = 0$, then $f(1) =$

A. $1 - \frac{\pi}{4}$

B. $\frac{\pi}{4} - 1$

C. $\tan 1 - \frac{\pi}{4}$

D. $\frac{\pi}{4}$

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20. If $\int f(x)dx = f(x)$, then $\int \{f(x)\}^2 dx$ is equal to

A. $\frac{1}{2}\{f(x)\}^2 + C$

B. $\{f(x)\}^2 + C$

C. $\frac{1}{3}\{f(x)\}^2 + C$

D. $\frac{1}{5}\{f(x)\}^2 + C$

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21. $\int \frac{nx^{n-1} + m^x \log m}{x^n + m^x} dx$ equals

A. $m^x - x^n + C$

B. $m^x + x^n + C$

C. $(m^x - x^n)^{-1} + C$

D. $\log(m^x + x^n) + C$

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22. $\int \frac{dx}{\sqrt{x+a}+\sqrt{x+b}}$

A. $\frac{2}{3(a-b)}\left\{(x+a)^{\frac{3}{2}}+(x+b)^{\frac{3}{2}}\right\}+C$

B. $\frac{2}{3(a-b)}\left\{(x+a)^{\frac{3}{2}}-(x+b)^{\frac{3}{2}}\right\}+C$

C. $3\left\{(x+a)^{\frac{3}{2}}+(x+b)^{\frac{3}{2}}+C\right.$

D. $(x+a)^2+(x+b)^2$

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23. Let $\int x^6 \sin\left(5x^7\right)dx = \frac{k}{5}\cos\left(5x^7\right)+C_1, x \neq 0,$ and $\int \frac{dx}{7x+14} = m\log|7x+$ then $k+m$ equals

A. 0

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. 3

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24. If $\int f(x)dx = F(x)$, $f(x)$ is a continuous function,then $\int \frac{f(x)}{F(x)}dx$ equals

A. $\log_e|f(x)| + C$

B. $\log_e|F(x)| + C$

C. $F(x) + C$

D. $(f(x))^2 + C$

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25. $\int \frac{\sin 2x}{2\cos^2 x + 3\sin^2 x} dx$ equals

A. $\log(2 + \sin x) + C$

B. $\log\left(2 + \cos^2 x\right) + C$

C. $\log\left(2 + \sin^2 x\right) + C$

D. $\log(2 + \cos x) + C$

Answer: C

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26. $\int \frac{x^2 dx}{\sqrt{x^3 - 2}}$ equals to

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27. $\int \sec x^\circ \, dx$ equals to

A. $\log \left| \sec x^\circ + \tan x^\circ \right| + C$

B. $\frac{\pi}{180^\circ}\log\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)+C$

C. $\frac{180^\circ}{\pi}\log\tan\left(\frac{\pi}{4}+\frac{x}{3}\right)+C$

D. $\frac{180^\circ}{\pi}\log\tan\left(\frac{\pi}{4}+\frac{\pi x}{360^\circ}\right)+C$

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

A. $\frac{1}{1+xe^x}+C$

B. $\log\left(\frac{xe^x}{1+xe^x}\right)+C$

C. $\frac{1}{1+xe^x}+\log\left(\frac{xe^x}{1+xe^x}\right)+C$

D. $x(e^x+1)+C$

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

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

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

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

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

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30. $\int \frac{dx}{x(1+4x^3+3x^6)}$

A. $\frac{1}{3}\log|x^3| + \frac{1}{6}\log|1+x^3| + C$

B. $\frac{1}{3}\log|x^3| + \frac{1}{3}\log|1+x^3| + C$

C. $\frac{1}{3}\log|x^3| + \frac{1}{6}\log|1+x^3| - \frac{1}{2}\log|1+3x^3| + C$

D. $\log|x^3+1| + C$

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

A. $e^{x-1}+\frac{1}{4}\cdot\frac{1}{(x-1)}+\tan^{-1}(x+3)+\log x+C$

B. $\frac{3}{8}\log|x-1|-\frac{1}{2}\frac{1}{(x-1)}+C$

C. $\frac{3}{8}\log|x-1|-\frac{1}{2}\frac{1}{(x-1)}+\frac{5}{8}\log|x+3|+C$

D. $\frac{1}{3}\tan^{-1}(x+1)+\log|x+3|+C$

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32.

$$\int \frac{2x+3}{(x-1)(x^2+1)}dx=\log_e\left\{(x-1)^{\frac{5}{2}}\left(x^2+1\right)^a-\frac{1}{2}\tan^{-1}x+C, x>1\right.$$

where C is any arbitrary constant, then the value of 'a' is

A. $\frac{5}{4}$

B. $-\frac{5}{3}$

C. $-\frac{5}{6}$

D. $-\frac{5}{4}$

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33. If $\int \frac{e^x - 1}{e^x + 1} dx = f(x) + C$, then f(x) is equal to

A. $2\log|e^x + 1|$

B. $\log|e^{2x} - 1|$

C. $2\log|e^x + 1| - x$

D. $\log|e^{2x} + 1|$

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34. $\int \frac{dx}{e^x + e^{-x}}$ equals

A. $\tan^{-1}\left(e^{-x}\right) + C$

B. $\tan^{-1}(e^x) + C$

C. $\log\left|e^x - e^{-x}\right| + C$

D. $\log\left(e^x + e^{-x}\right) + C$

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35. $\int \frac{x^2 - 1}{x\sqrt{x^4 + 3x^2 + 1}} dx =$

A. $\log\left|\frac{x^2 + 1 + \sqrt{x^4 + 3x^2 + 1}}{x}\right| + C$

B. $\log\left|\frac{x + 1 + \sqrt{x^2 + 3x + 1}}{x}\right| + C$

C. $\log\left|\frac{x^2 + 1 + \sqrt{x^2 + 1}}{x^2}\right| + C$

D. $\tan^{-1} x + C$

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36. $\int \cos \sqrt{x} dx = ?$

A. $2\left[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}\right] + C$

B. $2\left[\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}\right] + C$

C. $2\left[\cos \sqrt{x} - \sqrt{x} \sin \sqrt{x}\right) + C$

D. $-2\left[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}\right] + C$

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37. Evaluate $\int \log_e |x| dx$

A. $\log \log_x e + C$

B. $\frac{1}{(\log_x e)^2} + C$

C. $x \log_e \left(\frac{x}{e}\right) + C$

D. $e^x + C$

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38. Evaluate: $\int x^n \log x \, dx$

A. $\frac{x^{n+1}}{n+1}\left\{\log x + \frac{1}{n+1}\right\} + C$

B. $\frac{x^{n+1}}{n+1}\left\{\log x + \frac{2}{n+1}\right\} + C$

C. $\frac{x^{n+1}}{n+1}\left\{2\log x - \frac{1}{n+1}\right\} + C$

D. $\frac{x^{n+1}}{n+1}\left\{\log x - \frac{1}{n+1}\right\} + C$

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39. $\int (x-1)e^{3x} dx$ equals

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40. If $\int f(x)dx = g(x) + c$ and $f^{-1}(x)$ is differentiable, then $\int f^{-1}(x)dx$ equal to

A. $g^{-1}x + C$

B. $xf^{-1}(x) - g\left(f^{-1}(x)\right) + C$

C. $xf^{-1}(x) - g^{-1}(x) + C$

D. $f^{-1}(x) + C$

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41. Evaluate :

$$\int \tan^{-1}\sqrt{\frac{1-x}{1+x}}dx$$

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

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

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

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

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42. $\int e^{\sqrt{x}}dx$ is equal to

A. $e^{\sqrt{x}}+C$

B. $\frac{1}{2}e^{\sqrt{x}}+C$

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

D. $2\left(\sqrt{x}+1\right)e^{\sqrt{x}}+C$

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43. Evaluate: $\int(\log x)^2\,dx$

A. $x(\log x)^2-2x\log x-2x+C$

B. $x(\log x)^2 - 2x\log x - x + C$

C. $x(\log x)^2 - 2x\log x + 2x + C$

D. $x(\log x)^2 - 2x\log x + x + C$

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

A. $\frac{f(x)}{g(x)} + C$

B. $f(x)g'(x) - f'(x)g(x) + C$

C. $f(x)g'(x) + f'(x)g(x) + C$

D. $f(x) \cdot g(x) + C$

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45. $\int (1-x^2)\log x dx$ equals

A. $\left(x-\frac{x^3}{3}\right)\log x-\left(x-\frac{x^3}{9}\right)+C$

B. $\left(x-\frac{x^3}{3}\right)\log x+\left(x-\frac{x^3}{9}\right)+C$

C. $\left(x+\frac{x^3}{3}\right)\log x+\left(x+\frac{x^3}{9}\right)+C$

D. $x\log x+C$

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46. $\int (x^6+7x^5+6x^4+5x^3+4x^2+3x+1)e^x dx$ equals

A. $\sum_{i=0}^{6} x^i e^x+C$

B. $\sum_{i=1}^{7} x^i e^x+C$

C. $\sum_{i=1}^{6} x^i e^x+C$

D. $x^i e^x+C$

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47. $\int \frac{dx}{\sqrt{2-3x-x^2}} =$

A. $\tan^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+C$

B. $\sec^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+C$

C. $\sin^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+C$

D. $\cos^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+C$

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48. If $\int f(x)dx = x\cos\pi x + C$, then $f\left(\frac{1}{2}\right) =$

A. 0

B. π

C. $-\frac{\pi}{2}$

D. $\frac{\pi}{2}$

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

A. $\left(\frac{x+1}{2}\right)\sqrt{x^2+2x+5}+2\log\left|x+1+\sqrt{x^2+2x+5}\right|+C$

B. $\left(\frac{x+1}{2}\right)\sqrt{x^2+2x+5}+C$

C. $\log\left|x+1+\sqrt{x^2+2x+5}\right|+C$

D. $\left(x^2+2x+5\right)^{\frac{3}{2}}+C$

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50. Evaluate the following integral: $\int_0^{\pi/2}\frac{\sqrt{\cot x}}{\sqrt{\cot x}+\sqrt{\tan x}}dx$

A. π

B. $\frac{\pi}{2}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{3}$

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

A. 0

B. 1

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

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

A. 1

B. 0

C. -1

D. $\frac{1}{2}$

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53. The value of $\int_0^a \frac{dx}{x+\sqrt{(a^2-x^2)}}$ is equal to

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

D. $\frac{\pi}{6}$

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54. $\int_0^{\pi/2n} \frac{dx}{1+(\tan nx)^n}$ is equal to $n \in N$:

A. 0

B. $\frac{\pi}{4n}$

C. $\frac{\pi}{2n}$

D. $\frac{\pi}{2}$

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55. The value of $\int_0^{\pi/2} \frac{a\sin x + b\cos x}{\sin x + \cos x} dx$ is equal to

A. 0

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

C. $a+b$

D. $(a+b)\frac{\pi}{4}$

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56. $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$ is equal to

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57. $\int_{-1}^{1} x^{17} \cos^4 x \, dx$ is equal to

A. -2

B. -1

C. 0

D. 2

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58. $\int_{\pi/4}^{\pi/2} \operatorname{cosec}^2 x dx$ is equal to

A. -1

B. 1

C. 0

D. 3

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59. 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. $-\frac{1}{2}$

B. 0

C. 1

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

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60. Let $f: R \to R$ and $g: R \to R$ be continuous functions. Then the value of the integral $\int_{\frac{\pi}{2}}^{\frac{\pi}{2}} [f(x) + f(-x)][g(x) - g(-x)]dx$ is

A. π

B. 1

C. -1

D. 0

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61. The value of $\int_0^{\pi/2} \log \sin x dx$ is equal to

A. $-\left(\frac{\pi}{2}\right)\log 2$

B. $\pi \log. \frac{1}{2}$

C. $-\pi \log. \frac{1}{2}$

D. $\frac{\pi}{2}\log 2$

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

A. 0

B. 1

C. 2

D. 3

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63. The value of $\int_0^{2/3} \frac{dx}{4+9x^2}$ is equal to

A. $\frac{\pi}{12}$

B. $\frac{\pi}{24}$

C. $\frac{\pi}{4}$

D. 0

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64. The value of $\int_{\log 1/2}^{\log 2} \sin\left\{\frac{e^x-1}{e^x+1}\right\} dx$ is equal to

A. $\cos. \frac{1}{3}$

B. $\sin. \frac{1}{2}$

C. $2\cos 2$

D. 0

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65. $\int_0^1 \sqrt{\frac{1-x}{1+x}}\, dx$

A. $\left(\frac{\pi}{2}-1\right)$

B. $\left(\frac{\pi}{2}+1\right)$

C. $\frac{\pi}{2}$

D. $(\pi+1)$

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66. The value of $\int_0^{\pi/2} \frac{\cos x dx}{1+\cos x+\sin x}$ is equal to

A. $\frac{\pi}{4}+\log 2$

B. $\frac{\pi}{4}+\frac{1}{2}\log 2$

C. $\pi-\frac{1}{2}\log 2$

D. $\frac{\pi}{4} - \frac{1}{2}\log 2$

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67. If $l_1 = \int_0^{n\pi} f(|\cos x|)dx$ and $l_2 = \int_0^{5\pi} f(|\cos x|)dx$, then

A. $\frac{l_1}{l_2} = \frac{5}{n}$

B. $\frac{l_1}{l_2} = \frac{n}{5}$

C. $l_1 + l_2 = n + 5$

D. $l_1 - l_2 = n - 5$

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68. Suppose for every integer $n, . \int_{n}^{n+1} f(x)dx = n^2$. The value of $\int_{-2}^{4} f(x)dx$ is :

A. 16

B. 14

C. 19

D. 20

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69. Evaluate: $\int_{-\pi/2}^{\pi/2} \frac{1}{1+e^{\sin x}}dx$

A. 0

B. 1

C. \4

D. $\frac{\pi}{2}$

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

A. π

B. $a\pi$

C. 2Q9

D. 2π

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71. The value of $\int_1^2 \frac{dx}{x(1+x^4)}$ is

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72. The value of $\int_0^{\pi/2} \log \tan x \, dx$, is

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

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74. Evaluate $\int_0^{\pi/2} |\sin x - \cos x| dx$.

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75. $\int_0^{\pi} |\cos x| dx = ?$

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76. The value of the integral $\int_0^1 x(1-x)^n dx$ is -

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77. The value of the integral $\int_1^5 [|x-3|+|1-x|]dx$ is equal to-

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78. To find the numberical value of $\int_{-2}^{2} (px^3+qx+s)dx$ it is necessary to know the values of teh constants:

A. p

B. q

C. s

D. p and s

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79. The value of the integral $\int_{e^{-1}}^{e^2} \left| \frac{\ln x}{x} \right| dx$ is:

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80. $l_n = \int_0^{\pi/4} \tan^n x dx$, then $\lim_{n \to \infty} n[l_n + l_{n-2}]$ equals

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Objective Type Questions (Only one answer)

1. Evaluate : $\int \sqrt{1 + 2\cot x(\operatorname{cosec} x + \cot x)} dx$

A. $2 \ln \cos. \frac{x}{2} + C$

B. $2 \ln \sin. \frac{x}{2} + C$

C. $\frac{1}{2} \ln \cos. \frac{x}{2} + C$

D. $\frac{1}{2} \ln \sin. \frac{x}{2} + C$

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

A. $\frac{3}{8}\left(\frac{1}{x^2}-1\right)^{4/3}+C$

B. $-\frac{3}{8}\left[\left(1+\frac{1}{x^2}\right)^{4/3}\right]+C$

C. $\frac{1}{8}\left(1+\frac{1}{x^2}\right)^{4/3}+C$

D. $\frac{1}{8}\left(\frac{1}{x^2}-1\right)^{4/3}+C$

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3. $\int \frac{x^2-1}{x\sqrt{x^4+3x^2+1}}$dx is equal to

A. $\log_e\left|x-\frac{1}{x}+\sqrt{x^2+\frac{1}{x^2}-3}\right|+C$

B. $\log_e\left|x+\frac{1}{x}+\sqrt{x^2+\frac{1}{x^2}+3}\right|+C$

C. $\log_e\left|x+\sqrt{x^2+3}\right|+C$

D. $\log_e\left|x-\sqrt{x^2+3}\right|+C$

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4. Primitive of $\frac{3x^4-1}{\left(x^4+x+1\right)^2}$ w.r.t. x is

A. $\frac{x}{(x^4+x+1)}+C$

B. $\frac{-x}{(x^4+x+1)}+C$

C. $\frac{x+1}{(x^4+x+1)}+C$

D. $\frac{-x-1}{(x^4+x+1)}+C$

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5. Evaluate: $\int\frac{1}{x}\ln\left(\frac{x}{e^x}\right)dx=$

A. $\frac{1}{2}e^x - \ln x + C$

B. $\frac{1}{2}\ln x - e^x + C$

C. $\frac{1}{2}\ln^2 x - x + C$

D. $\frac{e^x}{2x} + C$

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6. Evaluate: $\int \frac{(2x+1)}{(x^2+4x+1)^{3/2}} dx$

A. $\frac{x^3}{(x^2+4x+1)^{1/2}} + C$

B. $\frac{x}{(x^2+4x+1)^{1/2}} + C$

C. $\frac{x^2}{(x^2+4x+1)^{1/2}} + C$

D. $\frac{1}{(x^2+4x+1)^{1/2}} + C$

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7. $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx$

A. $xe^{\tan^{-1}x}+C$

B. $x^2e^{\tan^{-1}x}+C$

C. $\frac{1}{x}e^{\tan^{-1}x}+C$

D. $\frac{(1+x^2)}{2}e^{\tan^{-1}x}+C$

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8. $\int\frac{dx}{\cos x+\sin x}$ is equal to

A. $\frac{1}{\sqrt{2}}\log\tan\left(\frac{x}{2}+\frac{\pi}{8}\right)+C$

B. $\frac{1}{\sqrt{2}}\log\left[\cos ec\left(\frac{x}{2}+\frac{\pi}{8}\right)+\cot\left(\frac{x}{2}+\frac{\pi}{8}\right)\right]+C$

C. $-\frac{1}{\sqrt{2}}\log\left[\cos ec\left(\frac{x}{2}+\frac{\pi}{8}\right)-\cot\left(\frac{x}{2}+\frac{\pi}{8}\right)\right]+C$

D. $-\frac{1}{\sqrt{2}}\log\left[\cos ec\left(\frac{x}{2}-\frac{\pi}{8}\right)+\cot\left(\frac{x}{2}-\frac{\pi}{8}\right)\right]+C$

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9. $\int \frac{\tan^{-1} x - \cot^{-1} x}{\tan^{-1} x + \cot^{-1} x} dx$ equals

A. $\frac{4x}{\pi}\tan^{-1} x + \frac{2}{\pi}\ln(1+x^2) - x + C$

B. $\frac{4x}{\pi}\tan^{-1} x - \frac{2}{\pi}\ln(1+x^2) + x + C$

C. $\frac{4x}{\pi}\tan^{-1} x + \frac{2}{\pi}\ln(1+x^2) + x + C$

D. $\frac{4x}{\pi}\tan^{-1} x - \frac{2}{\pi}\ln(1+x^2) - x + C$

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10. $\int \sin 2x \cdot \log_e \cos x dx$ is equal to

A. $\left(\frac{1}{2} + \log_e \cos x\right) \cdot \cos^2 x + C$

B. $\cos^2 x \cdot \log_e \cos x + C$

C. $\left(\frac{1}{2} - \log_e \cos x\right) \cdot \cos^2 x + C$

D. $(1 - \log_e \cos x) + C$

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11. $\int 7^{7^{7^x}} \cdot 7^{7^x} \cdot 7^x \, dx$

A. $\frac{7^{7^{7^x}}}{(\log 7)^3} + C$

B. $\frac{7^{7^{7^x}}}{(\log 7)^2} + C$

C. $7^{7^{7^x}} \cdot (\log 7)^3 + C$

D. $7^{7^{7^x}}$

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12. If $\int f(x)dx = f(x)$, then $\int \{f(x)\}^2 dx$ is equal to

A. $\frac{x\{f(x)\}^2}{2} - \frac{\{f(x)\}^2}{4} + C$

B. $x^2\frac{\{f(x)\}^2}{2}-\frac{\{f(x)\}^4}{4}+C$

C. $xf(x)-\frac{\{f(x)\}^2}{4}+C$

D. $xf(x)+C$

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13. $\int\frac{\cot^{-1}(e^x)}{e^x}dx$ is equal to

A. $\frac{1}{2}\ln\left(e^{2x}+1\right)-\frac{\cot^{-1}(e^x)}{e^x}+x+C$

B. $\frac{1}{2}\ln\left(e^{2x}+1\right)+\frac{\cot^{-1}(e^x)}{e^x}+x+C$

C. $\frac{1}{2}\ln\left(e^{2x}+1\right)-\frac{\cot^{-1}(e^x)}{e^x}-x+C$

D. $\frac{1}{2}\ln(e^x+1)-\frac{\cot^{-1}(e^x)}{e^x}-x+C$

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14. value of $e^{\tan\theta}(\sec\theta - \sin\theta)d(\theta)$ is equal to

A. $-e^{\tan\theta}\sin\theta + C$

B. $e^{\tan\theta}\sin\theta + C$

C. $e^{\tan\theta}\sec\theta + C$

D. $e^{\tan\theta}\cos\theta + C$

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15. The value of $\int \frac{1-x^7}{x(1+x^7)}dx$ is equal to

A. $\ln x + \frac{2}{7}\ln(1+x^7) + C$

B. $\ln x - \frac{2}{7}\ln(1-x^7) + C$

C. $\ln x - \frac{2}{7}\ln(1+x^7) + C$

D. $\ln x + \frac{2}{7}\ln(1-x^7) + C$

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16. $\int \frac{x^4+1}{x(x^2+1)^2}dx = A\ln|x| + \frac{B}{1+x^2} + C,$

A. $A = 1, B = -1$

B. $A = -1, B = 1$

C. $A = B = 1$

D. $A = B = -1$

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17. If $\int e^{3x}\cos 4x dx = e^{3x}(A\sin 4x + B\cos 4x) + C$, then:

A. $4A = 3B$

B. $2A = 3B$

C. $3A = 4B$

D. $3A = 2B$

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18. $\int \frac{2x^2+3}{(x^2-1)(x^2+4)}dx = a\log\left(\frac{x+1}{x-1}\right) + b\tan^{-1}\frac{x}{2}$, then (a,b) is

A. $\frac{1}{2}, \frac{1}{3}$

B. $1, 1$

C. $\frac{1}{2}, \frac{1}{2}$

D. $\frac{1}{3}, \frac{1}{3}$

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19. $\int \sin x d(\cos x)$ is equal to

A. $\frac{1}{4}\sin 2x + \frac{x}{2} + c$

B. $\frac{1}{4}\sin 2x - \frac{x}{2} + c$

C. $2\sin 2x + c$

D. $\sin x + \cos x + c$

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20. $\int \frac{dx}{x \cdot (\ln x)(\ln(\ln x)).....(\ln \ln \ln ... \ln x)_{20 \text{ times}}}$ is equal to

A. $\frac{(\log \log \log ..... x)}{20\text{times}} + c$

B. $\frac{(\log \log \log ..... x)}{19\text{times}} + c$

C. $\frac{(\log \log \log ..... x)}{21\text{times}} + c$

D. $\frac{(\log \log \log ..... x)}{22\text{times}} + c$

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21. If $\int \frac{dx}{3\sqrt{\sin^{11} x \cdot \cos x}} = -\frac{a\left(b + c\tan^2 x\right)}{d\tan^2 x (\tan x)^{2/3}} + k,$ then $a + b + c + d$ equal to

A. A) 8

B. B) 16

C. C) 24

D. D) 32

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22. If $\int \sqrt{\text{cosec}x + 1}dx = kfog(x) + c,$ where k is a real constant, then

A. 3

B. $\frac{4}{25}$

C. $\frac{25}{4}$

D. 1

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23. $\int\{1+\tan x\cdot\tan(x+A)\}dx=\cot A\cdot\ln|f(x)|+C$ then f(x) equal to

A. $\frac{sex(x+A)}{\sec x}$

B. $\frac{\cos ec(x+A)}{\cos ec(x-A)}$

C. $\frac{\cos ec(x-A)}{\cos ecx}$

D. $\frac{\sec(x-A)}{\sec x}$

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24. The value if $\int \frac{x^2-1}{(x^2+1)\left(\sqrt{x^4+1}\right)}dx$ equal to $\frac{1}{\sqrt{2}}\sec^{-1}(f(x))+c$, then $f(x)$ is

A. $\frac{x^2-1}{2x}$

B. $\frac{x^2-1}{\sqrt{2}x}$

C. $\frac{x^2+1}{2x}$

D. $\frac{x^2+1}{\sqrt{2}x}$

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25. If $\int f(x)\cos x dx = \frac{1}{2}f^2(x)+C$, then $f(x)$ can be

A. x

B. 1

C. $\cos x$

D. $\sin x$

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

A. $\cot^{-1}\left(\frac{x^2+1}{x}\right)$

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

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

D. $\cos^{-1}\left(\frac{x^2+1}{x}\right)$

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27. If the value of $\lim_{n\to\infty}\left\{\frac{1}{n+1}+\frac{1}{n+2}+\ldots\ldots+\frac{1}{6n}\right\}$ is $'K'$ then find value of $(K-\log_e 6)$?.

A. 0

B. 1

C. 2

D. -1

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28. If $[]$ and $\{\}$ represents greatest integar function and fractional function then $\int_{-1}^{1}([x]+\{x\}+|x|)dx$ equals

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

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29. Value of $\int_1^9 (x-2)(x-4)(x-6)(x-8)(x-5)dx$ is

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

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30. The solution for x of the equation $\int_{\sqrt{2}}^{x} \frac{dt}{t\sqrt{t^2-1}} = \frac{\pi}{2}$ is: (1) 2 (2) π (3) $\frac{\sqrt{3}}{2}$ (4) $2\sqrt{2}$

A. $2\sqrt{2}$

B. $-\sqrt{2}$

C. π

D. $\frac{\sqrt{3}}{2}$

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

A. $\frac{\pi}{4e^2}$

B. $\frac{\pi}{4e}$

C. $\frac{\pi}{2e^2}$

D. $\frac{\pi}{2e}$

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32. $\int_0^3 (|x| + |x-1| + |x-2|)dx$ equals

A. $\frac{9}{2}$

B. $\frac{15}{2}$

C. $\frac{19}{2}$

D. $\frac{21}{2}$

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33. 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) $\frac{\pi}{2}$

A. $-\pi$

B. 0

C. $\frac{-\pi}{2}$

D. $\frac{\pi}{2}$

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34. Let $y = (x - [x])^{[x]}$ where $[x]$ is greatest integar function, then $\int_0^3 y dx$ equals

A. $\frac{5}{6}$

B. $\frac{2}{3}$

C. 1

D. $\frac{11}{6}$

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35. Evaluate $\frac{\int_0^n [x]dx}{\int_0^n \{x\}dx}$ (where $[x]$ and $\{x\}$ are integral and fractional parts of x respectively and $n \varepsilon N$).

A. $\frac{1}{n-1}$

B. $\frac{1}{n}$

C. n

D. $n-1$

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

A. 0

B. 1

C. 2

D. 3

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37. Find the value of $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1+a^x}dx, a>0.$

A. π

B. $a\pi$

C. $\frac{\pi}{2}$

D. 2π

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38. Let f(x) be a continuous function such that f(a-x)+f(x)=0 for all $x \in [0, a]$. Then, the value of the integral $\int_0^a \frac{1}{1+e^{f(x)}} dx$ is equal to

A. a

B. $\frac{a}{2}$

C. $f(a)$

D. $\frac{1}{2}f(a)$

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

A. $l_1 = l_2 = l_3 = l_4 = 0$

B. $l_1 = l_2 = l_3 = 0$ but $l_4 \neq 0$

C. $l_1 = l_3 = l_4 = 0$ but $l_2 \neq 0$

D. $l_1 = l_4 = 0$ but $l_3 \neq 0$, and $l_2 \neq 0$

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40. Let f and g be continuous fuctions on [0, a] such that $f(x) = f(a - x)$ and $g(x) + g(a - x) = 4$ then $\int_0^a f(x)g(x)dx$ is equal to

A. $\frac{K}{2}$

B. $2K$

C. K

D. $4K$

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41. $\int_{-2}^{0}\{(x+1)^3+2+(x+1)\cos(x+1)dx$ is equal to (A) -4 (B) 0 (C) 4 (D) 6

A. -4

B. 0

C. 4

D. 6

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42. Let $f(x) = \frac{e^x + 1}{e^x - 1}$ and $\int_0^1 x^3 . \frac{e^x + 1}{e^x - 1} dx = \alpha$ Then, $\int_{-1}^1 t^3 f(t) dt$ is equal to

A. 0

B. α

C. 2α

D. α^2

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43. Value of the definite integral $\int_{-\frac{1}{2}}^{\frac{1}{2}} \left(\sin^{-1}\left(3x - 4x^3\right) - \cos^{-1}\left(4x^3 - 3x\right)\right) dx$

A. 0

B. $-\frac{\pi}{2}$

C. $\frac{7\pi}{2}$

D. $\frac{\pi}{2}$

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44. Let $f(x) = \int_0^x \frac{\sin^{100} t}{\sin^{100} t + \cos^{100} t} dt$, then $f(2\pi) =$

A. $2f\left(\frac{\pi}{2}\right)$

B. $4f\left(\frac{\pi}{2}\right)$

C. $f\left(\frac{\pi}{2}\right)$

D. $3f\left(\frac{\pi}{2}\right)$

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45. $\int_0^{\pi} (x . \sin^2 x . \cos x) dx$ is equal to

A. 0

B. $\frac{2}{9}$

C. $-\frac{2}{9}$

D. $-\frac{4}{9}$

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46. $\int_0^{1000} e^{x-[x]}\,dx$

A. $\frac{e^{1000}-1}{1000}$

B. $\frac{e^{1000}-1}{e-1}$

C. $1000(e-1)$

D. $\frac{e-1}{1000}$

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47. The value of the definite integral $\int_{19}^{37} \left((x)^2 + 3(\sin 2\pi x)\right) dx$ where (x) denotes the fractional part functicn

A. 0

B. 6

C. 9

D. 7

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48. If $l_n = \int_0^{\frac{\pi}{4}} \tan^n x dx$ show that $\frac{1}{l_2 + l_4}, \frac{1}{l_3 + l_5}, \frac{1}{l_4 + l_6}, \frac{1}{l_5 + l_7}, \ldots$ from an AP. Find its common difference.

A. An A.P.

B. A G.P.

C. A H.P.

D. None of these

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49. 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

A. $\frac{1}{35}$

B. $\frac{1}{14}$

C. $\frac{1}{10}$

D. $\frac{1}{5}$

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50. $\lim_{k\to 0}\frac{1}{k}\int_0^k(1+\sin 2x)^{\frac{1}{x}}dx$

A. 2

B. 1

C. e^2

D. Does not exists

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51. Let f(x) be a function satisfying $f'(x) = f(x)$ with $f(0) = 1$ and g(x) be a function that satisfies $f(x) + g(x) = x^2$. Then the value of the integral $\int_0^1 f(x)g(x)dx$, is

A. $e - \frac{e^2}{2} - \frac{5}{2}$

B. $e - e^2 - 3$

C. $\frac{1}{2}(e - 3)$

D. $e - \frac{1}{2}e^2 - \frac{3}{2}$

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52. Suppose that $F(x)$ is an anti-derivative of $f(x) = \frac{\sin x}{x}, where x > 0$. Then $\int_1^3 \tan^{-1} dx$ can be expressed as $F(6) - F(2)$ (b) $\frac{1}{2}(F(6) - f(2))$ $\frac{1}{2}(F(3) - f(1))$ (d) $2(F(6)) - F(2))$

A. $F(6) - F(2)$

B. $\frac{1}{2}[F(6) - F(2)]$

C. $\frac{1}{2}[F(3) - F(1)]$

D. $2[F(6) - F(2)]$

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53. If $f(x) = \begin{bmatrix} \sqrt{1-x} & 0 \le x \le 1 \\ (7x-6)^{-1} & 1 \le x \le 2 \end{bmatrix}$ then $\int_0^2 f(x)dx$ equals

A. $\frac{2}{3} - \frac{1}{7}\log 8$

B. $\frac{2}{3}+\frac{1}{7}\log 2$

C. $\frac{1}{42}$

D. $\frac{2}{3}+\frac{1}{7}\log 8$

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54. If $f: R \to R$ defined by $f(x)=\sin x+x$, then find the value of $\int_0^{\pi}\left(f^{-1}(x)\right)dx$

A. $\frac{\pi^2}{2}-2$

B. π^2

C. $\frac{\pi^2}{2}+2$

D. $\frac{\pi^2}{2}$

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55. The value of $\int_0^{100} \left[\tan^{-1} x\right] dx$ is, (where [*] denotes greatest integer function)

A. $\tan 1 - \tan 100$

B. $\frac{\pi}{2} - \tan 1$

C. $100 - \tan 1$

D. $\tan 1 - \frac{\pi}{2}$

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56. $If f(x) = \begin{cases} 0, where x = \frac{n}{n+1}, n = 1, 2, 31, elsewhere \end{cases}$ $then the value of \int_0^2 f(x) dx is$ 1 (b) 0 (c) 2 (d) ∞

A. 1

B. 2

C. 3

D. 0

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57. Let $g(x)$ be a continous and differentiable function such that

$$\int_0^2 \left\{ \int_{\sqrt{2}}^{\sqrt{5/2}} \left[2x^2 - 3\right] dx \right\} g(x) dx = 0, \text{then} g(x) = 0$$

when $x \in (0, 2)$ has (where,$[.]$ denotes the greatest integer function)

A. Exactly one real root

B. Atleast one real root

C. No real root

D. Two real roots

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58. Let $\frac{d}{dx}F(x) = \frac{e^{\sin x}}{x}. x < 0$. If $\int_1^4 \frac{2e^{\sin x^2}}{x}dx = F(k) - F(1)$ then find the possible value of k.

A. 10

B. 14

C. 16

D. 18

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59. $f: (0, \infty) \to R$ and $F(x) = \int_0^x tf(t)dt$

If $F(x^2) = x^4 + x^5$, then $\sum_{r=1}^{12} f(r^2)$ is equal to S

A. 216

B. 219

C. 221

D. 225

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60. $\int_{-\pi/4}^{\pi/4} x^3 \sin^4 x dx =$

A. 0

B. -1

C. $\frac{\pi^2}{16}$

D. $\frac{-\pi^2}{16}$

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61. The value of $\int_{-10}^{10} \left[\left\{f(f(x)\right\} + \left\{f\left(f\left(\frac{1}{x}\right)\right\}\right] dx$, where $f(x) = \frac{1-x}{1+x}$

A. 0

B. 20

C. 30

D. 25

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62. The value of $\int_{-2}^{2}\left(ax^{2011}+bx^{2001}+c\right)dx$, where a, b, c are constants depends on the value of

A. a

B. c

C. b

D. $a\&b$

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63. If for non zero x, $3f(x) + 4f\left(\frac{1}{x}\right) = \frac{1}{x} - 10$, then the value of $\int_2^3 f(x)dx$ is

A. $\frac{4}{7}\log.\frac{2}{3}$

B. $\frac{3}{4}\log.\frac{3}{2}$

C. $\frac{3}{7}\log.\frac{2}{3}$

D. 10

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64. The value of $\int_{2010\pi+\frac{\pi}{6}}^{2010\pi+\frac{\pi}{3}} (\sin x + \cos x)dx$ is

A. $\sqrt{2} - 1$

B. $\sqrt{3} - 1$

C. $\sqrt{3} + 1$

D. $\sqrt{2}+1$

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65. Let $\int_a^b f(x)dx = \int_{a+c}^{b+c} f(x-c)dx$. Then the value of $\int_0^{\pi} \sin^{2010} x \cdot \cos^{2009} x dx$ is

A. 2010

B. 2009

C. 0

D. 2011

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66. If $x^{f(x)} = e^{x-f(x)}$, then the value of integral $\int_1^2 f'(x)\left\{(1+\log x)^2\right\}dx + 1$ is

A. $3\log 3$

B. $2\log 2$

C. $\log 2$

D. $\log 3$

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67. If $\int_e^x tf(t)dt = \sin x - x\cos x - \frac{x^2}{2}$ for all $x \in R - \{0\}$, then the value of $f\left(\frac{\pi}{6}\right)$ will be equal to

A. 0

B. 1

C. $-\frac{1}{2}$

D. 10

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68. The value of the integral $\int_{-2012\pi}^{2012\pi}\left\{\frac{d}{dx}\left(\int_0^{x^2}\cos t^2 dt\right\}dx\right.$ is

A. 2012π

B. 4024π

C. 0

D. -2012π

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69. The value of $\int_{-2010\pi}^{2010\pi}\left\{x^{2011}\left(1+\tan\left(\frac{\pi}{3}-x\right)\left(1+\tan\left(x-\frac{\pi}{12}\right)\right)\right\}dx$ is

A. $\frac{\pi}{2012}$

B. $\frac{\pi}{2010}$

C. 0

D. $\frac{(2012)^2}{2}\theta$

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70. Let $f(x) = \min\{|x+2|, |x|, |x-2|\}$ then the value of the integral $\int_{-2}^{2} f(x)dx$ is

A. 4 sq. untis

B. 10 sq. units

C. 2 sq. untis

D. 7 sq. units

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Objective Type Questions (More than one answer)

1. $\int \frac{dx}{\sqrt{x^2+2x+1}} = A\log|x+1| + C, x \neq -1$ then

A. $A = \pm 1$

B. $A = 1$ if $x > -1$

C. $C \in R$

D. $A = -1$ if $x < -1$

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2. The value of $\int \frac{x^2+\cos^2 x}{1+x^2}\text{cosec}^2 x$ dx is equal to:

A. $\cot x + \cot^{-1} x + C$

B. $C - \cot x + \cot^{-1} x$

C. $-\tan^{-1}x - \frac{\cos x}{\sin x} + C$

D. $-e^{\ln \tan^{-1}x} - \cot x - C$

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3. If $l = \int\left(\sqrt{\tan x} + \sqrt{\cot x}\right)dx = f(x) + c$ then $f(x)$ is equal to

A. $\sqrt{2}\sin^{-1}(\sin x - \cos x)$

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

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

D. $\sin 2x$

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4. $\int \frac{dx}{5 + 4\cos x} = \lambda \tan^{-1}\left(m \tan. \frac{x}{2}\right) + C$ then

A. $\lambda = \frac{2}{3}$

B. $m = \frac{1}{3}$

C. $\lambda = \frac{1}{3}$

D. $m = \frac{2}{3}$

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5. The value of the integral $\int e^{\sin^2 x}\left(\cos x + \cos^3 x\right)\sin x dx$ is

A. $\frac{1}{2}e^{\sin^2 x}\left(3 - \sin^2 x\right) + C$

B. $e^{\sin^2 x}\left(1 + \frac{1}{2}\cos^2 x\right) + C$

C. $e^{\sin^2 x}\left(3\cos^2 x + s2 \in^2 x\right) + C$

D. $e^{\sin^2 x}\left(2\cos^2 x + s3 \in^2 x\right) + C$

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6. If $\int (3x^3 - 17)e^{2x}dx = \{Ax^3 + Bx^2 + Cx + D\}e^{2x} + k$ then

A. $3A + B = 0$

B. $B + C = 0$

C. $B - D = 0$

D. $A + B + C + D = -\frac{71}{8}$

Answer: B +C=0

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7. The relation

$\int (\sin 2x + \cos 2x) = \frac{1}{\sqrt{2}}\sin(2x - a) + c$ is true for

A. $a = \frac{\pi}{4}$

B. $a = -\frac{\pi}{4}$

C. $c \in R$

D. c is arbitrary

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8. The value of λ for which $\int \frac{4x^3 + \lambda 4^x}{4^x + x^4} dx = \log\left(4^x + x^4\right)$ is

A. 1

B. $\log_e 4$

C. $\log_4 e$

D. $\log_{e^2} 16$

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9. If primitive of $\sqrt{(1 + \sec x)}$ is $2fog(x) + c$, then

A. $g(x) = \sec x - 1$

B. $g(x) = \sqrt{(\sec x - 1)}$

C. $f(x) = 2\tan^{-1} x$

D. $f(x) = \tan^{-1} x$

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10. Let $f(0) = f'(0) = 0$ and $f''(x) = \sec^4 x + 4$ then find f(x)

A. $f\left(\frac{\pi}{4}\right) = \frac{1}{3}\log 2 + \frac{1}{6} + \frac{\pi^2}{8}$

B. $f\left(-\frac{\pi}{4}\right) = \frac{1}{3}\log 2 + \frac{1}{6} + \frac{\pi^2}{8}$

C. $f(x) = \frac{2}{3}\log|\sec x| + \frac{1}{6}\tan^2 x + 2x^2$

D. $f(x) = \frac{2}{3}\log|\cos x| - \frac{1}{6}\tan^2 x + 2x^2$

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11. If $\int \sec 2x dx = f\{g(x)\} + c$ then

A. Domain of $f(x) = R - \{0\}$

B. Range of $g(x) = R$

C. $f'(x) = \frac{1}{2x} f$ or $all x \in R^+$

D. $g'(x) = -\cos ec^2\left(\frac{\pi}{4} - x\right)$

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12. If $\int \tan^4 x dx = A\tan^3 x + B\tan x + \phi(x)$, then

A. $A = \frac{1}{3}$

B. $B = 1$

C. $\phi(x) = x + c$

D. $B = -1$

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13. If primitive of $\sin(\log x)$ is $f(x) \cdot \{\sin g(x) - \cos h(x)\} + c$, (c being constant of integration), then which of the following is correct (i) $\lim_{x \to 2} f(x) = 1$ (ii) $\lim_{x \to 1} \frac{g(x)}{h(x)} = 1$ (iii) $g\left(e^3\right) = 3$ (iv) $h\left(e^5\right) = 5$

A. $\lim_{x \to 2} f(x) = 1$

B. $\lim_{x \to 1} \frac{g(x)}{h(x)} = 1$

C. $g\left(e^3\right) = 3$

D. $h\left(e^5\right) = 5$

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14. If $\int \cos^{-1} x + \cos^{-1} \sqrt{1 - x^2} dx = Ax + f(x) \sin^{-1} x - 2\sqrt{1 - x^2} + c$ then

A. $f(x) = x$

B. $f(x) = -2x$

C. $A = \frac{\pi}{4}$

D. $A = \frac{\pi}{2}$

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15. If $\int \frac{3x+4}{x^3-2x-4}\,dx = \log|x-2| + k\log f(x) + c$, then (i) $f(x) = \left|x^2+2x+2\right|$ (ii) $f(x) = x^2+2x+2$ (iii) $k = \frac{1}{2}$ (iv) $k = -\frac{1}{4}$

A. $f(x) = \left|x^2 2x+2\right|$

B. $f(x) = x^2+2x+2$

C. $k = \frac{1}{4}$

D. $k = -\frac{1}{2}$

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16. A primitive of $\sin 6x$ is

A. $\frac{1}{3}\left(\sin^6 x - \sin^3 x\right) + c$

B. $-\frac{1}{3}\cos^2 3x + c$

C. $\frac{1}{3}\sin^2 3x + c$

D. $\frac{1}{3}\sin\left(3x + \frac{\pi}{7}\right)\sin\left(3x - \frac{\pi}{7}\right) + c$

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17. If $\int \frac{\sin x}{\sin(x-a)} dx = f(x)\sin a + g(x)\cos a + c$, then

A. $f(x) = \log|\sin(x-a)|$

B. $g(x) = x - a$

C. $g(x) = \sin(x-a)$

D. $f(x) = \sin x$

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18. If $f(x) = \int_1^x \frac{\ln t}{1+t} dt$ where x>0, then the values of of x satisfying the equation $f(x) + f\left(\frac{1}{x}\right) = 2$ is

A. 2

B. e

C. e^{-2}

D. e^2

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19. The value of $\int_0^\infty \frac{x dx}{(1+x)(1+x^2)}$ is equal to

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. Is same as $\int_0^{\infty} \frac{dx}{(1+x)(1+x^2)}$

D. None of these

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20. If $f(x) = \int_0^x \frac{\sin t}{t} dt,\ x > 0,$ then

A. Maximum if $x = (2n-1)\pi$

B. Minimum if $x = 2n\pi$

C. Maximum if $x = 2n\pi$

D. The function is monotonic

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

A. $\frac{\pi}{4} + 2\ln 2 - \tan^{-1} 2$

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

C. $2\ln 2 - \cot^{-1} 3$

D. $-\frac{\pi}{4} + \ln 4 + \cot^{-1} 2$

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22. $\int_a^b sgn(x)dx$ equals $(a, b \in R)$

A. $|b| - |a|$

B. $(b-a)sgn(b-a)$

C. $bsgn(b) - asgn(a)$

D. $|a| - |b|$

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23. $If A_n = \int_0^{\frac{\pi}{2}} \frac{\sin(2n-1)x}{\sin x} dx, b_n = \int_0^{\frac{\pi}{2}} \left(\frac{\sin nx}{\sin x}\right)^2 dx f$ or $n \in N$,

Then (a) $A_{n+1} = A_n$ (b) $B_{n+1} = B_n$ (c) $A_{n+1} - A_n = B_{n+1}$ (d) $B_{n+1} - B_n = A_{n+1}$

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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24. $\int_0^1 \sin\left(x^2 + 2x + 1\right) dx - \int_1^2 \sin x^2 dx$ is equal to (i)0 (ii)1 (iii)2

A. 0

B. 1

C. 2

D. $\int_{-4}^{4} \cos x^2 dx - 8\int_{0}^{1} \cos 16(2x-1)^2 dx$

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25. $If x = \int_0^y \frac{dt}{\sqrt{1+9t^2}} and \frac{d^2y}{dx^2} = ay, then f \in da$

A. 0

B. 3

C. -3

D. 1

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26. The integral $\int_0^{\pi} xf(\sin x)dx$ is equal to

A. $\frac{\pi}{2}\int_0^{\pi} f(\sin x)dx$

B. $\frac{\pi}{4}\int_0^{\pi} f(\sin x)dx$

C. $\pi\int_0^{\pi/2} f(\sin x)dx$

D. $\pi\int_0^{\pi/2} f(\cos x)dx$

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27. Let f(x) be an odd continous function which is periodic with period 2. If $g(x) = \int_0^x f(t)dt$, then

A. $g(x)$ is odd function

B. $g(2x) = 1$

C. $g(2x) = 0$

D. $g(x)$ is even function

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28. If $I = \int_3^4 \frac{1}{3\sqrt{\log x}} dx$ then

A. $l < 1$

B. $l > 1$

C. $l > 0.92$

D. $l < 0.92$

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29. Let $f: (0, \infty) \to R$ and $F(x) = \int_0^x tf(t)dt.$

If $F\left(x^2\right) = x^4 + x^5$, then

A. $F(4) = 7$

B. $f(x)$ is continuous everywhere

C. $f(x)$ is increases for all $x > 0$

D. $f(x)$ is onto

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30. Let $l_1 = \int_1^{10^4} \frac{\{\sqrt{x}\}}{\sqrt{x}} dx$ and $l_2 = \int_0^{10} x\{x^2\} dx$ where $\{x\}$ denotes fractional part of x then

A. $l_1 = l_2$

B. $l_1 > l_2$

C. $l_1 = 4l_2$

D. $l_1 = 100$

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31. If $f(x) = x^2 \int_0^1 f(t)dt + 2$, then

A. (a) $f(x) = 3x^2 + 2$

B. (b) $12x^2 + 2$

C. (c) Slope of $y = f(x)$ at $x = 1$ is 5

D. (d) $\int_0^2 f(x)dx = 12$

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32. If $f(x) = \int_0^x tf(t)dt + 2,$ then

A. $f(x)$ is strictly increasing function for $x \in R$

B. $f(x)$ is strictly increasing function for $x \in (0, \infty)$

C. $f(x)$ has a point of minima at $x = 0$

D. $2 < \int_0^1 f(x)dx < 2\sqrt{e}$

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Linked Comprehension Type Questions

1. Reduction formulas can be used to compute integrals of higher power of $\sin x, \cos x, \tan x$ etc.

$\int \sin^5 x dx = -\frac{1}{5}\sin^4 x \cos x + A \sin^2 x \cos x - \frac{8}{15}\cos x + C$ then A equals

A. $-\frac{2}{15}$

B. $-\frac{3}{5}$

C. $-\frac{4}{15}$

D. $-\frac{1}{15}$

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2. Reduction formulas can be used to compute integrals of higher power of $\sin x, \cos x, \tan x$ etc.

$\int \tan^6 x dx = \frac{1}{5}\tan^5 x + A \tan^3 x + \tan x - x + C$ then

A. $A = \frac{1}{3}$

B. $A = \frac{2}{3}$

C. $A = -\frac{2}{3}$

D. $A = -\frac{1}{3}$

Answer: A= -1/3

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3. Reduction formulas can be used to compute integrals of higher power of $\sin x, \cos x, \tan x$ etc.

$\int \sec^6 x dx = \frac{1}{5}\tan^5 x + A\tan^3 x + \tan x + C$ then

A. $A = \frac{1}{3}$

B. $A = \frac{2}{3}$

C. $A = -\frac{1}{3}$

D. $A = -\frac{2}{3}$

Answer: 2/3

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4. If the integrand is a rational function of x and fractional power of a linear fractional of the form $\frac{ax+b}{cx+d}$, then rationalization of the integral is affected by the substitution $\frac{ax+b}{cx+d} = t^m$, where m is L.C.M. of fractional powers of $\frac{ax+b}{cx+d}$.

If $\int \frac{dx}{(x-1)^{3/4}(x+2)^{5/4}} = A\left(\frac{x-1}{x+2}\right)^{1/4} + C$ then

A. $A = \frac{1}{3}$

B. $A = \frac{2}{3}$

C. $A = \frac{3}{4}$

D. $A = \frac{4}{3}$

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5. If the integrand is a rational function of x and fractional power of a linear fractional of the form $\frac{ax+b}{cx+d}$, then rationalization of the integral is affected by the substitution $\frac{ax+b}{cx+d}=t^m$, where m is L.C.M. of fractional powers of $\frac{ax+b}{cx+d}$.

$\int \frac{dx}{(x+1)^{2/3}(x-1)^{4/3}} = k\left[\frac{1+x}{1-x}\right]^{1/3} + C$ then

A. $k=\frac{2}{3}$

B. $k=\frac{3}{2}$

C. $k=\frac{1}{3}$

D. $k=\frac{1}{2}$

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6. If the integrand is a rational function of x and fractional power of a linear fractional of the form $\frac{ax+b}{cx+d}$, then rationalization of the integral is affected by the substitution $\frac{ax+b}{cx+d}=t^m$, where m is L.C.M. of

fractional powers of $\frac{ax+b}{cx+d}$.

If $\int \frac{dx}{(x-1)\sqrt{1-x^2}} = k\sqrt{\frac{x+1}{1-x}} + C$ then

A. $k = \frac{1}{2}$

B. $k = 1$

C. $k = \frac{1}{3}$

D. $k = \frac{2}{3}$

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7. Let $f(x) = \frac{9^x}{9^x + 3}$

If $g(x) = \int\left(\frac{1}{11} + \frac{2}{11} + ... + \frac{10}{11}\right)dx$, then

A. $g(x) = 2x + c$

B. $g(x) = 10x + c$

C. $g(x) = 5x + c$

D. $g(x) = \frac{10}{11}x + c$

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8. Let $f(x) = \dfrac{9^x}{9^x + 3}$

Let $h(x) = \int f(x)dx$. If $h(\log_9 6) = 1$, then $h(x) =$

A. $\ln(9^x + 3)$

B. $\log_6(9^x + 3)$

C. $\dfrac{\log_6(9^x + 3)}{\ln 9}$

D. $\log_9(9^x + 3)$

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9. The average value of a function $f(x)$ over the interval $[a, b]$ is the number $\mu = \dfrac{1}{b-a}\int_a^b f(x)dx$. The square root $\left\{\dfrac{1}{b-a}\int_a^b f^2(x)dx\right\}^{\frac{1}{2}}$ is called the root mean square of f on $[a, b]$. The average value μ is

attained if f is continuous on $[a, b]$.

The average value of $f(x) = \dfrac{\cos^2 x}{\sin^2 x + 4\cos^2 x}$ on $\left[0, \dfrac{\pi}{2}\right]$ is

A. $\dfrac{1}{\pi}$

B. $\dfrac{2}{\pi}$

C. $\dfrac{4}{\pi^2}$

D. $\dfrac{2}{\pi^2}$

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10. The average value of a function $f(x)$ over the interval $[a, b]$ is the number $\mu = \dfrac{1}{b-a}\displaystyle\int_a^b f(x)dx$. The square root $\left\{\dfrac{1}{b-a}\displaystyle\int_a^b f^2(x)dx\right\}^{\frac{1}{2}}$ is called the root mean square of f on $[a, b]$. The average value μ is attained if f is continuous on $[a, b]$.

The average value of $f(x) = \dfrac{\cos^2 x}{\sin^2 x + 4\cos^2 x}$ on $\left[0, \dfrac{\pi}{2}\right]$ is

A. $\dfrac{(20)^{\frac{2}{3}}}{(10)^{\frac{1}{3}} + 2^{\frac{1}{3}}}$

B. $\dfrac{10}{(10)^{\frac{1}{3}}+2^{\frac{1}{3}}}$

C. $\dfrac{2(20)^{\frac{2}{3}}}{(10)^{\frac{1}{3}}+2^{\frac{1}{3}}}$

D. $\dfrac{8(20)^{\frac{2}{3}}}{(10)^{\frac{1}{3}}+(2)^{\frac{1}{3}}}$

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11. The average value of a function $f(x)$ over the interval $[a, b]$ is the number $\mu = \dfrac{1}{b-a}\int_a^b f(x)dx$. The square root $\left\{\dfrac{1}{b-a}\int_a^b f^2(x)dx\right\}^{\frac{1}{2}}$ is called the root mean square of f on $[a, b]$. The average value μ is attained if f is continuous on $[a, b]$.

The average value of $f(x) = \dfrac{\cos^2 x}{\sin^2 x + 4\cos^2 x}$ on $\left[0, \dfrac{\pi}{2}\right]$ is

A. $\dfrac{\pi}{6}$

B. $\dfrac{4}{\pi}$

C. $\dfrac{6}{\pi}$

D. $\frac{1}{6}$

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Assertion-Reason Type Questions

1. Statement 1: $\int \frac{xe^x dx}{(1+x)^2} = \frac{e^x}{x+1} + C$

Statement 2: $\int e^x (f(x) + f'(x)) dx = e^x f(x) + C$

A. (a) Statement 1 and Statement 2 are true and Statement 2 is the correct explantation for Statement 1

B. (b) Statement 1 and Statement 2 are true but Statement 2 is not the correct explantation for Statement 1

C. (c) Statement 1 is true but Statement 2 is false

D. (d) Statement 2 is true but Statement 1 is false

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2. STATEMENT-1 : $\int x^x(1+\log x)dx = x^x + C$

and

STATEMENT-2 : $\frac{d}{dx}x^x = x^x(1+\log x)$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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3. STATEMENT-1 : $\int \frac{x^2-1}{x^2} e^{\left(\frac{x^2+1}{x}\right)} dx = e^{\frac{x^2+1}{x}} + C$

and

STATEMENT-2 : $\int f'(x) e^{f(x)} dx = e^{f(x)} + c$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B

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4. STATEMENT-1 : If $l_n = \int \tan^n x dx$ then $9(l_8 + l_{10}) = \tan^9 x$

and

STATEMENT-2 : $l_n = \int \tan^n x dx$ then $l_n = \frac{\tan^{n+1} x}{n+1} + c, n \neq -1.$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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5. STATEMENT-1 : $\int \tan 5x \tan 3x \tan 2x dx$ is equal to $\frac{\log|\sec 5x|}{5} - \frac{\log|\sec 3x|}{3} - \frac{\log|\sec 2x|}{2} + c$

and

STATEMENT-2: $\tan 5x - \tan 3x - \tan 2x = \tan 5x \tan 3x \tan 2x.$

A. (a)Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. (b)Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. (c)Statement-1 is True, Statement-2 is False

D. (d)Statement-1 is False, Statement-2 is True

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6. STATEMENT-1 : $\int \frac{dx}{e^x + e^{-x} + 2} = -\frac{1}{e^x + 1} + c$

and

STATEMENT-2 : $\int \frac{d(f(x))}{(f(x))^2} = -\frac{1}{f(x)} + c$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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7. STATEMENT-1 : If $f(x) = \int \frac{dx}{\sin^{1/2} x \cos^{7/2} x}$, then the value of $f\left(\frac{\pi}{4}\right) - f(0)$ is equal to $\frac{12}{5}$.

and

STATEMENT-2 : To find the $\int \sin^m x \cos^n x dx$ if $m + n =$ $-ve$ even, then we can substitute $\tan x = t$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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8. STATEMENT-1 : If $f\left(\frac{3x-4}{3x+4}\right)=x+2$, then $\int f(x)dx$ is equal to $\frac{2}{3}x-\frac{8}{3}\log|x-1|+c.$

and

STATEMENT-2 : If $f\left(\frac{3x-4}{3x+4}\right)=x+2$, then $f(x)=\frac{2}{3}-\frac{8}{3(x-1)}.$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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9. STATEMENT-1 :

$\int \frac{e^{\log\left(1+\frac{1}{x^2}\right)}}{x^2+\frac{1}{x^2}}dx = \frac{1}{\sqrt{2}}\tan^{-1}.\frac{x^2-1}{\sqrt{2}x}+c$ and $STATEMENT-2: e^{\log x}$ x if x gt 0`.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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10. STATEMENT-1 : $\int_0^{\frac{\pi}{2}} \frac{x \sin x \cos x}{\sin^4 x + \cos^4 x} dx = \frac{\pi^2}{32}$

and

STATEMENT-2 : $\int_0^a f(x)dx = \int_0^a f(a-x)dx$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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11. STATEMENT-1 : $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin\left(\log\left(x+\sqrt{1+x^2}\right)\right)dx = 0$

and

STATEMENT-2 : $\int_{-a}^{a} f(x)dx = 0$ if $f(x)$ is an even function

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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12. STATEMENT-1 : $\int_{-2\pi}^{5\pi} \cot^{-1}(\tan x)dx = 7\frac{\pi^2}{2}$

and

STATEMENT-2 : $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx, a < c < b$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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13. STATEMENT-1 : $\int_0^{\frac{\pi}{2}} \sin 2kx.\cot x.\,dx = \frac{\pi}{2}$, where $k \in r$

and

STATEMENT-2 : $\frac{\sin 2kx}{\sin x} = 2[\cos x + \cos 3x + \ldots . + \cos(2k-1)x]$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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14. STATEMENT-1 : If $n \in N \int_{-n}^{n} (-1)^{[x]} dx = 2n$

and

STATEMENT-2 : $(-1)^{[x]}$ is odd if `x is odd integer

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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15. STATEMENT-1 : $\int_0^2 [x + [x + [x]]]dx = 3$

and

STATEMENT-2 : $\int_a^b f(x)dx = \int_a^b f(a + b - x)dx$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explantation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explantation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

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Integar Type Questions

1. If $\int \frac{\sin x + 3\cos x}{\sin x + \cos x} dx = \frac{kx}{2} + \ln(\sin x + \cos x)$, then k is_____.

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2. If the graph of anti-derivative $g(x)$ of $\frac{3x}{(x-1)(x-2)}$ intersect the line $x = 2$ at a point with ordinate $5 + \ln 16$, then the term independent of x in $g(x)$ is _____.

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3. If $\int \frac{\ln\left(\frac{x-1}{x+1}\right)}{x^2-1} dx = \frac{1}{a} \cdot \left(\ln\left|\frac{x-1}{x+1}\right|\right)^b + c$, then $a^2 - b^2 - ab$ is equal to _____.

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4.

If $\int x \frac{In\left(x+\sqrt{1+x^2}\right)}{\sqrt{1+x^2}} dx = a\sqrt{1+x^2} In\left(x+\sqrt{1+x^2}\right) + bx + c,$

then

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5. If $\int_0^{18\pi} [\sin x + \cos x] dx = -k\pi$ and $[.]$ denotes the greatest integar function, then k is ____.

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6. If $\int_{\pi/6}^{\pi/3} \sin x dx = k \int_{\pi/6}^{\pi/3} \cos x dx$, then k is _____.

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7. If $I = \int_1^2 \frac{dx}{\sqrt{x} - \sqrt{x-1}}$, then value of $\frac{9}{32}(l)^2$, is _____.

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8. If $l = \int_0^{\pi/2} \frac{\cos x}{1+\sin^2 x} dx$, then $\frac{4}{\pi} l$ is _____.

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Multiple True-False Questions

1. STATEMENT-1 : If $\int \frac{2^x}{\sqrt{1-4^x}} = k \sin^{-1}(2^x)$, then k equals $\frac{1}{\log 2}$.

STATEMENT-2 : If $\int f(x)dx = -f(x) + c$, then $f(\log_e 2) = \frac{1}{2}$

STATEMENT-3 : $\int \frac{e^x}{\sqrt{1+e^x}} dx = -2\sqrt{1+e^x} + c$

A. TTT

B. TTF

C. TFT

D. FFT

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2. STATEMENT-1 : If $\int \frac{1}{f(x)} dx = 2\log|f(x)| + c$, then $f(x) = \frac{x}{2}$.

STATEMENT-2 : When $f(x) = \frac{x}{2}$, then $\int \frac{1}{f(x)} dx = \int \frac{2}{x} dx = 2\log|x| + c$

STATEMENT-3 : $\int e^{x^2} dx = e^{x^2} + c$

A. TTT

B. TTF

C. FTT

D. FFF

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3. STATEMENT-1 : $\int_{-3}^{3} |x| dx = 9$

STATEMENT-2 : $\int_{0}^{1} \tan^{-1} x dx = \frac{\pi}{4} - \ln\sqrt{2}$

STATEMENT-3 : $\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx = \frac{\pi}{4}$

A. TFT

B. TTT

C. FFF

D. FFT

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4. STATEMENT-1 : $\int_0^{\infty} \frac{dx}{1+e^x} = \ln 2 - 1$

STATEMENT-2 : $\int_0^{\infty} \frac{\sin\left(\tan^{-1}\right)}{1+x^2}dx = \pi$

STATEMENT-3 : $\int_0^{\pi^2/4} \frac{\sin\sqrt{x}}{\sqrt{x}}dx = 1$

A. TFT

B. TTT

C. FFF

D. FFT

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Subjective Type Questions

1. Let $F(x)$ be the antiderivative of $f(x) = 3\cos x - 2\sin x$ whose graph passes through the point $\left(\frac{\pi}{2}, 1\right)$. Then $F\left(\frac{\pi}{3}\right)$ is equal to.....

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2. Let f be a function satisfying $f''(x) = x^{-\frac{3}{2}}$, $f'(4) = 2$ and $f(0) = 0$. Then $f(784)$ equals.....

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3. If $\int \frac{dx}{e^{2x} + e^{-2x}} = \frac{A}{842}\tan^{-1} e^{2x} + C$ then A equals ...

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4. If $\int \frac{dx}{(x^2+1)^2} = \frac{A}{148}\tan^{-1}x + \frac{1}{2}\frac{x}{x^2+1} + C$ then A equals.....

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5. If $\int \frac{f(x)}{x^3-1}dx = \log\left|\frac{x^2+x+1}{x-1}\right| + \frac{A}{948\sqrt{3}}\left(\tan^{-1}\frac{2x+1}{\sqrt{3}}\right) + C,$ where $f(x)$ is a polynomial of second degree in x such that $f(0) = f(1) = 3f(2) = 3$, then A equals.....

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6. If $\int \frac{\sin x}{1+\sin x}dx = \frac{A}{798}\sec x - \tan x + x + C$ then A equals.....

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7. The value of $\int_1^{e^{37}} \frac{\pi \sin(\pi \log x)}{x} dx$ is .....

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8. $\frac{\left(\sqrt{2}+1\right)198}{\pi} \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{\phi d\phi}{1+\sin\phi}$ equal to _____.

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9. For $x \varepsilon R$, and a continuous function f let $I_1 = \int_{\sin^2 t}^{1+\cos^2 t} x f\{x(2-x)\} dx$ and $I_2 = \int_{\sin^2 t}^{1+\cos^2 t} f\{x(2-x)\} dx$. Then $\frac{I_1}{I_2}$ is

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10. $\frac{d}{dx} \int_{x^2}^{x} \sqrt{\cos t} dt$ (at $x = 0$) equals to _____.

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11. $100\int_0^{1.5} x\left[x^2\right]dx$ equals to _____.

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12. $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt{\cot x}}dx$ is $\pi/3$ b. $\pi/2$ c. $\pi/6$ d. $\pi/12$

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13. Prove that $\ln 2 < \int_0^1 \frac{dx}{\sqrt{1+x^4}} < \frac{\pi}{2}\Bigg)$

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

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15. $If f(x) = x + \int_0^1 (xy^2 + x^2 y)(f(y))dy$, find $f(x)$ if x and y are independent.

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Aakash Challengers Questions

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

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2. If $\cos\theta > \sin\theta > 0$, then evaluate :

$$\int \left\{ \log\left(\frac{1 + \sin 2\theta}{1 - \sin 2\theta}\right)^{\cos^2\theta} + \log\left(\frac{\cos 2\theta}{1 + \sin 2\theta}\right) \right\} d\theta$$

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3. $\int \frac{1}{\tan x + \cot x + \sec x + \text{cosec } x} dx$ is equal to

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4. $\int \frac{a + b\sin x}{(b + a\sin x)^2} dx$

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5. Evaluate $\int \frac{1}{\sqrt{e^{5x}}\sqrt[4]{(e^{2x} + e^{-2x})^3}}.$

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6. Evaluate

$\int \cot^{-1}(x^2 + x + 1) dx$

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7. Evaluate $\int \frac{\tan\left(\frac{\pi}{4} - x\right)}{\cos^2 x \sqrt{\tan^3 x + \tan^2 x + \tan x}} dx.$

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

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9. Let f be a real-valued function satisfying $f(x) + f(x+4) = f(x+2) + f(x+6)$ Prove that $\int_x^{x+8} f(t)dt$ is constant function.

A. 1

B. 2011

C. 2010

D. 8

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10. If $f(x) = \int_1^x \frac{\log t}{1+t+t^2}$, $\forall x \geq 1$, then $f(2)$ is equal to

A. $f(0)$

B. $f(1)$

C. $f\left(\frac{1}{2}\right)$

D. $f(4)$

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11. Given a real-valued function f which is monotonic and differentiable. Then $\int_{f(a)}^{f(b)} 2x\left(b - f^{-1}(x)\right)dx =$

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12. If $\int_0^{\pi}\left(\frac{x}{1+\sin x}\right)^2 dx = A,$ then the value for $\int_0^{\pi}\frac{2x^2.\cos^2 x/2}{(1+\sin x^2)}dx$ is equal to

A. A

B. $A+2\pi$

C. $A+2\pi-\pi^2$

D. $A+2\pi-2\pi^2$

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Try yourself

1. Find an anti-derivative of $\sec^2\left(\frac{x}{4}\right)$.

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2. Find an anti-derivative of the function $f(x)$

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3. Evaluate: $\int\left(e^{5(\log)_e x}-\frac{e^{4(\log)_e x}}{e^{3(\log)_e x}-e^{2\log x}}dx\right.$

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4. Evaluate : $\int\frac{\cos(x-\alpha)}{\cos x}dx.$

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5. $\int\frac{\tan^4\sqrt{x}\sec^2\sqrt{x}}{\sqrt{x}}dx$

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6. Evaluate : $\int \left\{ \frac{\sin^n x}{\cos^{n+6} x} \right\}^{\frac{1}{3}} dx.$

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7. Evaluate: $\int \cos^7 x dx$

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8. Evaluate: $\int \sin^2 x \cos^5 x \, dx$

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9. Evaluate: $\int \frac{1}{\sqrt{\sin^3 x \cos^5 x}} dx$

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10. Evaluate: $\int \sec^{4\backslash 3} x \cos ec^{8\backslash 3} x \, dx$

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

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12. $\int \frac{dx}{\sin(x - \alpha)\sin(x - \beta)}$

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

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14. Evaluate the following integrals

$$\int \sqrt{\frac{x^4}{a^6 + x^6}} dx$$

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15. Evaluate : $\int \frac{1}{x^2 + 4x + 13} dx.$

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16. Evaluate :

$$\int \frac{dx}{x(x^7 + 1)}$$

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

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18. Evaluate : $\int \frac{dx}{\sqrt{5x+4x-x^2}}$

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

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20. Evaluate : $\int \frac{2x+3}{2x^2+6x+5} dx.$

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21. Evaluate : $\int \frac{x+2}{\sqrt{5-4x-x^2}} dx.$

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22. Evaluate : $\int \frac{x+2}{\sqrt{x^2+4x+10}} dx.$

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23. Evaluate: $\int \frac{2x+3}{x^2+3x+2}$

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

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

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

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27. Evaluate: $\int \frac{x^2}{(x^2+1)(x^2+4)}\,dx$

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28. Find : $\int \frac{(3\sin\theta-2)\cos\theta}{5-\cos^2\theta-4\sin\theta} dth\eta\theta\cdot$

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

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30. Evaluate : $\int xe^{x^2}dx.$

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31. Evaluate : $\int\left\{\frac{1+\sin x}{x-\cos x}\right\}dx.$

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32. Evaluate : $\int(1-\tan x)\sec^2 x dx.$

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33. Evaluate : $\int\sqrt{4-x-x^2}dx.$

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

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35. Evaluate $\int_1^3 x^3 dx$

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36. Evaluate $\int_0^2 2^x dx$

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37. Evaluate $\int_0^{\pi/4} \frac{dx}{1+\sin x}$

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38. Evaluate $\int_0^{\pi/2} \cos^4 x dx$

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39. $\int e^x(3+x)dx$

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40. Evaluate : $\int_0^{\pi/2} \frac{\cos x}{(1+\sin x)(2+\sin x)}dx$

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41. Evaluate $\int_1^3 (x^2-2x)dx$

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42. Evaluate $\int_0^3 (x^2-4)dx$

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43. Evaluate

$$\int_{-\pi/3}^{\pi/3} \frac{\sqrt{1+\sin 2x}}{|\cos x|} dx,$$

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44. Evaluate $\int_0^{\pi/3} \left| \frac{\sin^{-1} \sin x}{\cos^{-1} \cos x} \right| dx$

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45. $\int_0^{\pi/2} (\sin x - \cos x) \log(\sin x + \cos x) dx = 0$

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46. Evaluate $\int_0^{\pi/2} \frac{\sin x - \cos x}{1 + \sin x \cdot \cos x} dx$

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47. Evaluate $\int_1^2 \frac{\log x}{x} dx$

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48. Evaluate $\int_0^1 \log\left(\sin\left(\frac{\pi x}{2}\right)\right) dx$

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49. Evaluate $\int_{\log 1/3}^{\log 3} \tan\left(\frac{e^x - 1}{e^x + 1}\right) dx$

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50. Evaluate $\int_0^1 \frac{\ln(1+x)}{1+x} dx$

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