MATHS

BOOKS - ML KHANNA

INTEGRATION

PROBLEM SET (1)(MULTIPLE CHOICE QUESTIONS)

1. $\int \frac{e^{x-1}+x^{e-1}}{e^x+x^e}dx =$

A. $\log(e^x+x^e)$

B. $e\log(e^x+x^e)$

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

D. none

Answer: C

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

A. $\log\left(x^4+1\right)$

B. $3\log\left(x^4+1\right)$

C. $-\log\left(x^4+1\right)$

D. $\frac{1}{4}\log\left(x^4+1\right)$

Answer: D

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

A. $\frac{1}{3}(1+\log x)^3$

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

C. $\log(1+\log x)$

D. none

Answer: A

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

A. $\tan x - x$

B. $x + \tan x$

C. $x - \tan x$

D. $-x - \cot x$

Answer: C

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5. $\int \frac{dx}{x \log x \log(\log x)} =$

A. $\log(\log x)$

B. $\log[\log(\log x)]$

C. $[\log(\log x)]^2$

D. none

Answer: B

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6. $\int \frac{\log(\log x)}{x \log x} dx =$

A. $[\log(\log x)]^2$

B. $\frac{1}{2}[\log(\log x)]^2$

C. $\log(\log x)$

D. none

Answer: B

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7. Let $F(x) = f(x) + f\left(\frac{1}{x}\right)$, where $f(x) = \int_t^x \frac{\log t}{1+t} dt$. (1) $\frac{1}{2}$ (2) 0 (3) 1 (4) 2

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

B. 0

C. 1

D. 2

Answer: A

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8. If $f(\theta) = [\cos i\theta - i \sin i\theta], i = \sqrt{-1}$ then the value of $\int_{-3}^{-1} [f(\theta) + f(2\theta) + f(3\theta) + \ldots . \infty] d\theta$=

A. $\log\left(1 + e + e^2\right]$

B. $\log\left(1 + e^{-1} + e^2\right]$

C. $\log\left(1+e+e^{-1}\right)$

D. $\log\left(1+e^{-1}+e^{-2}\right)$

Answer: D

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9. $\int \frac{1+x\sin x+\cos x}{x(1+\cos x)}dx =$

A. $\log x(1+\cos x)$

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

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

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

Answer: D

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10. The solution for x of the equation

$$\int_{\sqrt{2}}^{x} \frac{1}{t\sqrt{t^2-1}}dt = \frac{\pi}{2}, \text{ is}$$

A. 2

B. π

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

D. $-\sqrt{2}$

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11. $\int \frac{\sin x}{\sin x - \cos x}dx =$

A. $x + \log(\sin x - \cos x)$

B. $\frac{1}{2}[x + \log(\sin x - \cos x)]$

C. $x - \log \sin\left(x + \frac{\pi}{4}\right)$

D. $x + \log \cos\left(x + \frac{\pi}{4}\right)$

Answer: B

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12. Prove that

$$\sqrt{2}\int \frac{\sin x dx}{\sin\left(x - \frac{\pi}{4}\right)} = x + \log\left|\sin\left(x - \frac{\pi}{4}\right)\right|$$

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13. If $\int_0^{\pi/3} \cdot \frac{\cos x}{3 + 4\sin x} dx = k\log\left(\frac{3 + 2\sqrt{3}}{3}\right)$ then k is

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

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

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

D. $\frac{1}{8}$

Answer: C

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

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

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

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

D. $\log \cos x - \frac{1}{2}x^2$

Answer: B

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15. $\int \frac{10x^9 + 10^x \log_e 10}{x^{10} + 10^x} dx$ equals

A. $10^x - x^{10}$

B. $10^x + x^{10}$

C. $\left(10^x - x^{10}\right)$

D. $\log\left(10^x + x^{10}\right)$

Answer: D

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

A. $\log[x(x + \cos x)] + c$

B. $\log\left(\frac{x}{\mathrm{x} + \cos \mathrm{x}}\right) + c$

C. $\log\left(\frac{x + \cos x}{x}\right)$

D. none of these

Answer: B

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17. If $\int f(x)dx = f(x)$, then

A. $f(x) = x$

B. $f(x)$ = constant

C. $f(x) = 0$

D. $f(x) = e^x$

Answer: D

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18. $I = \int_0^1 \frac{\sin x}{\sqrt{x}} dx$ and $J = \int_0^1 \frac{\cos x}{\sqrt{x}} dx$

Then which one of the following is true ?

A. $I > \frac{2}{3}$ and $J > 2$

B. $I < \frac{2}{3}$ and $J < 2$

C. $I < \frac{2}{3}$ and $J > 2$

D. $I > \frac{2}{3}$ and $J < 2$

Answer: B

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19. $\int \frac{\sin 2x}{a\cos^2 x + b\sin^2 x} dx =$

A. $(b-a)\log\left(a - \cos^2 x + b\sin^2 x\right)$

B. $1/(b-a)\log\left(a\cos^2 x + b\sin^2 x\right)$

C. $1/(b-a)\log\left(a\cos^2 x - b\sin^2 x\right)$

D. none of these

Answer: B

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20. $\int_0^{\pi/2} \frac{\sin 2x}{a^2 + b^2\sin^2 x} dx =$

A. 0

B. $\pi/4$

C. $\frac{1}{b^2}\log\left(\frac{a^2+b^2}{a^2}\right)$

D. $\frac{1}{b^2}\log\left(a^2+b^2\right)$

Answer: C

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21. Let $f(x)$ be a function differentiable on $[0, a]$ such that $f(0) = 1, f(a) = 3^{1/6}$

If $f'(x) \geq [f(x)]^4 + [f(x)]^{-2}$, then the maximum value of a is

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

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

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

D. $\frac{\pi}{36}$

Answer: D

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22. $\int \frac{\tan(\log x)}{x} dx$ =

A. $\log \cos(\log x)$

B. $\log \sec \ (\log x)$

C. $\log \sin \ (\log x)$

D. None of these

Answer: B

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23. $\int \tan x \tan 2x \tan 3x dx$

A. $-\frac{1}{3}\log \sin 3x + \frac{1}{2}\log \sin 2x + \log \sin x$

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

C. $-\frac{1}{3}\log\sin 3x+\frac{1}{2}\log\cos 2x\ +\log\ \sin x$

D. $-\frac{1}{3}\log\cos 3x+\frac{1}{2}\log\sin 2x\ +\log\ \cos x$

Answer: B

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24. $\int\frac{\cos(\log x)}{x}dx$ =

A. $\sin[\log(\log x)]$

B. $\log[\sin(\log x)]$

C. $\log[\cos(\log x)]$

D. none

Answer: D

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25. $\int \frac{1}{\sin x + \sqrt{3}\cos x} dx$

A. $\frac{1}{2}\log \tan\left(\frac{1}{2}x + \frac{1}{6}\pi\right)$

B. $\frac{1}{2}\log\ [\text{cosec}(x + \pi/3) - \cot(x + \pi/3)]$

C. $\frac{1}{2}\log[\sec(x - \pi/6) + \tan\ (x - \pi/6)]$

D. $-\frac{1}{2}\log[\cos ec(x + \pi/3) + \cot(x + \pi/3)]$

Answer: A::B::C::D

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26. $\int \frac{dx}{\cos x + \sqrt{3}\sin x}$ equals :

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

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

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

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

Answer: A

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27. $\int \frac{1}{\sqrt{1+\sin x}} dx =$

A. $\sqrt{2}\log\tan(x/4+\pi/8)$

B. $\sqrt{2}\log[\cos ec(x/2+\pi/4)-\cos(x/2+\pi/4)]$

C. $\sqrt{2}\log[\sec(x/2-\pi/4)+\tan(x/2-\pi/4)]$

D. $\sqrt{2}\log[\sec(x/2+\pi/4)+\tan(x/2-\pi/4)]$

Answer: A::C

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28. $\int \frac{1}{\cos x-\sin x} dx$ is equal to

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

B. $\frac{1}{\sqrt{2}}\log\cot\ \frac{x}{2}$

C. $\frac{1}{\sqrt{2}}\log\tan\left(\frac{x}{2}-\frac{3\pi}{8}\right)$

D. $\frac{1}{\sqrt{2}}\log\tan\left(\frac{x}{2}+\frac{3\pi}{8}\right)$

Answer: D

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29. $\int x\sqrt{\left[\frac{2\sin(x^2-1)-\sin 2(x^2-1)}{2\sin(x^2-1)+\sin 2(x^2-1)}\right]}dx$

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30. Integral of $f(x)=\sqrt{1+x^2}$ w.r.t. x^2 is

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

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

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

D. none

Answer: C

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31. $\int \frac{d(x^2+1)}{\sqrt{(x^2+2)}} =$

A. $\sqrt{x^2+2}$

B. $2\sqrt{x^2+2}$

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

D. none

Answer: B

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32. $\int e^{x \log a} e^x dx$ is equal to

A. $(ae)^x$

B. $\frac{(ae)^x}{\log(ae)}$

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

D. none of these

Answer: B

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33. $\int\{1+2\tan x(\tan x+\sec x)\}^{1/2}dx$ is equal to

A. $\log\sec x(\sec x-\tan x)+c$

B. $\log\sec x(\sec x+\tan x)+c$

C. $\log(\sec x+\tan x)+c$

D.

Answer: C

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34. $\int \frac{\sin x - \cos x}{\sqrt{1 - \sin 2x}} e^{\sin x} \cos x dx$ is equal to

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

B. $e^{\sin x - \cos x} + c$

C. $e^{\sin x + \cos x} + c$

D. $e^{\cos x - \sin x} + c$

Answer: A

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

A. $\frac{-1}{\sin x + \cos x} + c$

B. $\log(\sin x + \cos x) + c$

C. $\log(\sin x - \cos x) + c$

D. $\log(\sin x + \cos x)^2 + c$

Answer: B

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36. $\int \frac{\cos 2x}{\cos x} dx$ is equal to

A. $2\sin x + \log(\sec x - \tan x) + c$

B. $2\sin x - \log(\sec x - \tan x) + c$

C. $2\sin x + \log(\sec x + \tan x) + c$

D. $2\sin x - \log(\sec x + \tan x) + c$

Answer: D

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37. $\int \sqrt{\frac{e^x - 1}{e^x + 1}} dx$ =

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

B. $\log\left(e^x + \sqrt{e^{zx} - 1}\right) + \sec^{-1} e^x$

C. $\log\left(e^x - \sqrt{e^{zx} - 1}\right) - \sec^{-1} e^x$

D. none

Answer: A

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38. If $\int_0^{\pi/3} \cdot \frac{\cos x}{3 + 4\sin x} dx = k\log\left(\frac{3 + 2\sqrt{3}}{3}\right)$ then k is

A. $1/2$

B. $1/3$

C. $1/4$

D. $1/8$

Answer: C

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39. Evaluate the following integrals

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

A. $\frac{12}{13} + \frac{5}{13}\log(3\cos x + 2\sin x)$

B. $\frac{12}{13}x - \frac{5}{13}\log(3\cos x + 2\sin x)$

C. $\frac{5}{13}x + \frac{12}{3}\log(3\cos x + 2\sin x)$

D. none

Answer: B

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40. If $l'(x)$ means $\log\log\log x$, the log being repeated r times, then $\int \left[xl(x)l^2(x)l^3(x)l'(x)\right]^{-1} ds$ 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

A. $l^{r+1}(x)$

B. $\frac{l^{r+1}(x)}{r+1}$

C. $l^r(x)$

D. none

Answer: A

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41. $\int \frac{\sqrt{(\tan x)}}{\sin x \cos x} dx =$

A. $2\sqrt{(\cot x)}$

B. $\sqrt{(\cot x)}$

C. $\sqrt{(\tan x)}$

D. $2\sqrt{(\tan x)}$

Answer: D

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42. $\int_0^{\pi/4} \frac{\sqrt{\tan x}}{\sin x \cos x} dx$ equals

A. 1

B. 2

C. 0

D. 4

Answer: B

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43. $\int \frac{x^6(x+1)}{\sqrt{(5x^{10}) + 6x^9 + x^4}} dx =$

A. $\frac{\sqrt{(5x^6 + 6x^5 + 1)}}{15}$

B. $\frac{\sqrt{(5x^8 + 6x^7 + x^2)}}{30}$

C. $\frac{\sqrt{(5x^8 + 6x^7 + x^2)}}{15}$

D. $\sqrt{(5x^{10} + 6x^5 + x^4)}$

Answer: A

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44. $\int_0^{\pi/4} \sec^2 x \sin x dx = \int_0^a \frac{dx}{\sqrt{x} + \sqrt{x+a}}$ then α =

A. $9/16$

B. $25/16$

C. $9/25$

D. $\frac{16}{25}$

Answer: A

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45. $\int \frac{\sec x dx}{\sqrt{\sin(2x+\alpha) + \sin\alpha}}$

A. $\sqrt{2(\sin x + \tan\alpha)\sec\alpha}$

B. $\sqrt{2(\tan x + \tan \alpha)\sec \alpha}$

C. $\sqrt{(\tan x + \tan \alpha)\sec \alpha}$

D. none of these

Answer: B

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46. $\int \frac{1}{\sqrt{\sin^3 x \cos x}} dx$ is equal to

A. $\frac{-2}{\sqrt{(\tan x)}} + c$

B. $2\sqrt{\tan x} + c$

C. $\frac{2}{\sqrt{(\tan x)}} + c$

D. $-2\sqrt{\tan x} + c$

Answer: A

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47. The tangent to the graph of the function $y = f(x)$ at the point with abscissa $x = a$ makes with x-axis an angle of $\pi/3$ and at the abscissa $x = b$ an angle of $\frac{\pi}{4}$. The value of the integral $\int_a^b f'(x)f''(x)dx$ is

A. $\frac{1}{2}(1-\sqrt{3})$

B. $\frac{1}{2}(1+\sqrt{3})$

C. -1

D. none

Answer: C

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48. The equation of a curve is $y = f(x)$. The tangents at $(1, f(1)), (2, f(2))$ and $(3, f(3))$ make angle $30^\circ, 60^\circ$ and 45° respectively with +ive direction of x-axis then the value of $\int_2^3 f'(x)f''(x)dx + \int_1^3 f''(x)dx$ is :

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. $-\sqrt{3}$

D. $-\frac{1}{\sqrt{3}}$

Answer: D

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49. The function f whose graph passes through the point $(0, 7/3)$ and whose derivative is $f'(x) = x\sqrt{1-x^2}$ is given by

A. $f(x) = -\frac{1}{3}\left[\left(1-x^2\right)^{3/2} - 8\right]$

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

C. $f(x) = -\frac{1}{3}\left[\sin^{-1} x + 7\right]$

D. none of these

Answer: A

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50. $\int x^x(1+\log x)dx$

A. x^x

B. $\frac{x^x}{\log x}$

C. $x^x \log x$

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

Answer: A

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51. $\int \tan^3 2x \sec 2x dx =$

A. $\sec^3 2x + 3\sec 2x$

B. $\frac{1}{6}[\sec^3 2x - 3\sec 2x]$

C. $\sec^3 2x - 3\sec 2x$

D. None of these

Answer: B

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52. If $\phi(x) = \int \cot^4 x dx + \frac{1}{3}\cot^3 x - \cot x$ and $\phi\left(\frac{\pi}{2}\right) = \frac{\pi}{2}$ then $\phi(x)$ is

(A) $\pi - x$

(B) $x - \pi$

(C) $\frac{\pi}{2} - x$

(D) x

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

B. $x - \pi$

C. $\pi - x$

D. x

Answer: D

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53. $\int \cos^3 x e^{\log(\sin x)}\, dx$ is equal to

A. $-\frac{\sin^4 x}{4} + c$

B. $-\frac{\cos^4 x}{4} + c$

C. $\frac{e^{\sin x}}{4} + c$

D. none of these

Answer: B

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54. $\int_{\log\sqrt{\pi}}^{} -\left(\log\sqrt{\pi/2}\right) e^{2x} \sec^2\left(\frac{1}{3}e^{2x}\right) dx$= .....

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

B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

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

Answer: C

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55. The value of the integral $\int_2^4 \frac{\sqrt{x^2-4}}{x^4}dx$ is

A. $\sqrt{\frac{3}{32}}$

B. $\frac{\sqrt{3}}{32}$

C. $\frac{32}{\sqrt{3}}$

D. $-\frac{\sqrt{3}}{32}$

Answer: B

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56. The solution of t the equation $\int_{\sqrt{2}}^{t} \frac{dx}{x\sqrt{(x^2-1)}} = \frac{\pi}{12}$ is

A. 2

B. $\sqrt{2}$

C. $2\sqrt{3}$

D. 1

Answer: A

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57. $\int_{0}^{\infty} \frac{dx}{\left[x+\sqrt{(x^2+1)}\right]^3} =$

A. $3/8$

B. $1/8$

C. $-3/8$

D. none

Answer: A

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58. $\int |x|^3 dx$ is equal to

A. $\frac{x^4}{4}$

B. $-\frac{x^4}{4}$

C. $\frac{|x|^4}{4}$

D. none of these

Answer: D

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59. $\int \sec^{2/3} x \cos ec^{4/3} x dx$ is equal to

A. $3(\tan x)^{1/3}$

B. $3(\cot x)^{-1/3}$

C. $-3(\tan x)^{-1/3}$

D. $-3(\cot x)^{-1/3}$

Answer: C

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60. $\int \frac{\log(x+1)-\log x}{x(x+1)}dx$ equals

A. $-\log\left(\frac{x+1}{x}\right)+c$

B. $-\log\left[\log\left(\frac{x+1}{x}\right)\right]+c$

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

D. $c-\frac{1}{2}\left[\log(x+1)^2-(\log x)^2\right]$

Answer: C

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61. $\int \frac{f(x)\phi'(x) - f'(x)\phi(x)}{f(x).\,\phi(x)}[\log\phi(x) - \log f(x)]dx =$

A. $\frac{1}{2}\left\{\log\left(\frac{\phi(x)}{f(x)}\right)\right\}^2$

B. $\frac{\log(\phi(x))}{f(x)}$

C. $\frac{\phi(x)}{f(x)}\log\frac{\phi(x)}{f(x)}$

D. none

Answer: A

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62. The value of $\int_1^2 [f_1\{f_2(x)\}]^{-1} f'_1[f_2(x)]f'_2(x)dx$ where $f_2(1) = f_2(2)$, is equal to

A. 0

B. 1

C. 2

D. none

Answer: A

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63. $\int_0^1 \frac{dx}{[ax+b(1-x)]^2}$ is equal to

A. ab

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

C. $\frac{b}{a}$

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

Answer: D

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64. The value of the integral $\int \frac{dx}{x^n(1+x^n)^{1/n}}, n \in N$ is

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

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

C. $-\frac{1}{(1-n)}\left(1-\frac{1}{x^n}\right)^{1-\frac{1}{n}}$

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

Answer: A

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65. The value of $\int \frac{1}{x^2(x^4+1)^{3/4}}dx$, is

A. $\left(1+\frac{1}{x^4}\right)^{1/4}$

B. $-\left(1+\frac{1}{x^4}\right)^{1/4}$

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

D. none

Answer: B

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

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

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

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

D. none

Answer: B

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67. $\int \frac{dx}{x^n(1+x^n)^{1/n}} (n \in N) = \alpha\left(1+\frac{1}{x^3}\right)^{\beta} + C$ then α and β are roots of the quadratic

A. $6x^2 - x - 2 = 0$

B. $6x^2 + x - 2 = 0$

C. $6x^2 + x + 2 = 0$

D. $6x^2 - x + 2 = 0$

Answer: A

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68. if $\int \frac{x^{3/2}}{x^{5/2} + x^4} dx = a\log\frac{x^b}{1 + x^b} + C$ then (a, b) is equal to

A. $\left(\frac{3}{2}, \frac{2}{3}\right)$

B. $\left(\frac{2}{3}, \frac{3}{2}\right)$

C. $\left(\frac{3}{2}, 1\right)$

D. none

Answer: B

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69. Let $f(x) = \min\left[x+1, \sqrt{1-x}\right]$, then $\int_{-1}^{1} f(x)dx$ is

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

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

C. $\frac{7}{6}$

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

Answer: C

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70. The value of $\int \frac{\left(x-x^3\right)^{1/3}}{x^4} dx$ is

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

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

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

D. none of these

Answer: B

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71. $\int \frac{\left(x^4 - x\right)^{1/4}}{x^5} dx$ is equal to

A. $\frac{4}{15}\left(1 - \frac{1}{x^3}\right)^{5/4} + c$

B. $\frac{4}{5}\left(1 - \frac{1}{x^3}\right)^{5/4} + c$

C. $\frac{4}{15}\left(1 + \frac{1}{x^3}\right)^{5/4} + c$

D. none of these

Answer: A

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72. Let $f(x) = \frac{x}{(1+x^n)^{\frac{1}{n}}}$ for $n \geq 2$ and $g(x) = \underbrace{fofo...of}_{\text{f occurs n times}}(x)$. Then $\int x^{n-2} g(x) dx$ equals (A) $\frac{1}{n(n-1)}(1+nx^n)^{1-\frac{1}{n}} + K$ (B)

$\frac{1}{n-1}(1+nx^n)^{1-\frac{1}{n}}+K$ (C) $\frac{1}{n(n+1)}(1+nx^n)^{1+\frac{1}{n}}+K$ (D) $\frac{1}{n+1}(1+nx^n)^{1-\frac{1}{n}}+K$

A. $\frac{1}{n(n-1)}(1+nx^n)^{1-(1/n)}+K$

B. $\frac{1}{n-1}(1+nx^n)^{1-(1/n)}+K$

C. $\frac{1}{n(n-1)}(1+nx^n)^{1+(1/n)}+K$

D. $\frac{1}{n+1}(1+nx^n)^{1+(1/n)}+K$

Answer: A

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73. The vlaue 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

A. π

B. 2π

C. 4π

D. none of these

Answer: B

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74. If $\int f(x)\sin x\cos x dx = \frac{1}{2(b^2-a^2)}\log f(x) + c$ then $f(x) =$

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

B. $\frac{1}{a\sin x + b\sin x}$

C. $\frac{1}{a^2\cos^2 x + b^2\sin^2 x}$

D. none

Answer: A

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75. $\int_0^1 \frac{x}{(1-x)^{3/4}} dx =$

A. $12/5$

B. $16/5$

C. $-16/5$

D. none of these

Answer: B

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76. $\int \frac{1}{\left[(x-1)^3(x+2)^5\right]^{\frac{1}{4}}} dx$ is equal to

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

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

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

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

Answer: A

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77. $\int \frac{dx}{(x+\alpha)^{8/7}(x-\beta)^{6/7}} =$

A. $\frac{6}{\alpha+\beta}\left(\frac{x-\beta}{x+\alpha}\right)^{1/6}$

B. $\frac{6}{\alpha+\beta}\left(\frac{x+\alpha}{x-\beta}\right)^{1/6}$

C. $\frac{7}{\alpha+\beta}\left(\frac{x+\alpha}{x-\beta}\right)^{1/7}$

D. $\frac{7}{\alpha+\beta}\left(\frac{x-\beta}{x+\alpha}\right)^{1/7}$

Answer: D

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78. $\int \frac{xdx}{(x^2+1)^{4/5}(x^2+2)^{6/5}} =$

A. $\frac{2}{5}\left(\frac{x^2+2}{x^2+1}\right)^{1/5}$

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

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

D. none of these

Answer: B::C

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79. $\int_0^{2\pi}\sqrt{1+\sin\frac{x}{2}}dx=$

A. 0

B. 2

C. 8

D. 4

Answer: C

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80. $\int x^2 e^{x^3} \cos\left(e^{x^3}\right) dx$ is equalto

A. $3\sin\left(e^{x^3}\right)$

B. $\sin\left(e^{x^3}\right)$

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

D. $-\frac{1}{3}\sin\left(e^{x^3}\right)$

Answer: C

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81. $\int \frac{\cos\sqrt{x}}{\sqrt{x}} dx =$

A. $2\cos\sqrt{x}$

B. $\sqrt{(\cos x)/x}$

C. $\sin\sqrt{x}$

D. $2\sin\sqrt{x}$

Answer: D

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82. $\int_0^{\pi^2/4} \frac{\sin\sqrt{x}}{\sqrt{x}} dx$

A. 2

B. 1

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

D. $\frac{\pi^2}{8}$

Answer: A

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83. $\int \frac{dx}{\sin^2 x \cos^2 x} =$

A. $\tan x + \cot x$

B. $\tan x - \cot x$

C. $\tan x . \cot x$

D. $\tan x - \cot 2x$

Answer: B

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84. $\int_1^{\pi/2} \frac{dx}{1+\sin x}$ equals

A. 0

B. $1/2$

C. 1

D. $3/2$

Answer: C

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85. $\int \frac{e^x(1+x)}{\cos^2(xe^x)}\,dx =$ $2(\log)_e \cos(xe^x)+C$ (b) $\sec(xe^x)+C$ (c) $\tan(xe^x)+C$ (d) $\tan(x+e^x)+C$

A. $-\cot(xe^x)$

B. $\tan(e^x)$

C. $\tan(xe^x)$

D. None of these

Answer: B

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86. $\int_2^4 \left(\frac{\sqrt{(x^2-4)}}{4}\right)dx =$

A. $2\left(3\sqrt{3}-\pi\right)/3$

B. π

C. $2\left(3\sqrt{3}-\pi\right)$

D. None of these

Answer: D

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87. Evaluate: $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$

A. $\pi/3$

B. $2\pi/3$

C. $\pi/6$

D. $\pi/12$

Answer: D

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

A. $\pi/6$

B. $\pi/24$

C. $\pi/12$

D. None of these

Answer: B

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89. Evaluate: $\int_0^1 \frac{dx}{e^x + e^{-x}}$

A. $\frac{\tan^{-1}(e-1)}{e+2}$

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

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

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

Answer: C

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90. $\int \frac{\sqrt{x}}{\sqrt{(a^3 - x^3)}} dx =$

A. $\frac{2}{3}(x/a)^{3/2}$

B. $\frac{2}{3}\sin^{-1}(x/a)^{3/2}$

C. $\frac{2}{3}\cos^{-1}(x/a)^{3/2}$

D. None of these

Answer: B

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91. $\int_{-1}^{0} \frac{dx}{x^2 + 2x + 2}$ is equal to

A. 0

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

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

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

Answer: B

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92. $\int \sqrt{\frac{\cos x - \cos^3 x}{1 - \cos^3 x}} dx$ is equal to

A. $\frac{2}{3}\sin^{-1}\left(\cos^{3/2} x\right) + c$

B. $\frac{3}{2}\sin^{-1}\left(\cos^{3/2} x\right) + c$

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

D. none of these

Answer: C

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93. The value of the integral $\int_0^1 \frac{dx}{x^2 + 2x\cos\alpha + 1}, 0 < \alpha < \pi$ is

A. $\sin\alpha$

B. $\alpha\sin\alpha$

C. $2\alpha\sin\alpha$

D. $\frac{\alpha}{2}\sin\alpha$

Answer: D

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94. If $\int_{\log 2}^{x}\frac{dy}{(e^y-1)}=\frac{\pi}{6}$ then $x=$

A. $x=\log 2$

B. $x=\log 6$

C. $x=\log 8$

D. $x=\log 4$

Answer: D

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95. $\int \frac{2^x}{\sqrt{1-4^x}} dx = \lambda \sin^{-1} 2^x + c$ then λ equals to

A. $\log 2$

B. $1/2$

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

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

Answer: D

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96. $\int \frac{e^{\log\left(1+1/x^2\right)}}{x^2+1/x^2} dx$ is

Note : $e^{\log t} = t$

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

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

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

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

Answer: D

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97. The value of the integral $\int_0^{\log 5} \frac{e^x\sqrt{e^x-1}}{e^x+3}dx$ is

A. $3+2\pi$

B. $4-\pi$

C. $2+\pi$

D. none

Answer: B

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98. The value of $\int_{\ln 3}^{\ln 4} \frac{e^x\sqrt{e^x-3}}{e^x-2}dx$ is

A. $\frac{4-\pi}{2}$

B. $4-\frac{\pi}{2}$

C. $2-\pi$

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

Answer: A

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99. $\int \frac{1}{2\sqrt{(x)}(1+x)}dx =$

A. $\cot^{-1}(\sqrt{x}$

B. $\tan^{-1}\sqrt{x}$

C. $\sec^{-1}\sqrt{x}$

D. none

Answer: B

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100. $\int \frac{\sin 2x}{\sin^4 x + \cos^4 x} dx$

A. $\tan^{-1}(\cot^2 x)$

B. $\tan^{-1}(\tan^2 x)$

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

D. none

Answer: B

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101. Evaluate : $\int \frac{1}{4 + 5\sin x} dx$

A. $\frac{2\tan(x/2) + 1}{2\tan(x/2) + 4}$

B. $\log\left(\frac{2\tan(x/2)+1}{\tan(x/2)+4}\right)$

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

D. $\frac{1}{3}\log\left[\frac{2\tan(x/2)+1}{2\tan(x/2)+4}\right]$

Answer: D

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102. $\int\frac{1}{5+4\cos x}dx$

A. $\tan^{-1}\left[\frac{2}{3}\tan(x/2)\right]$

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

C. $\tan^{-1}\left[\tan^2(x/2)\right]$

D. none

Answer: C

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103. $\int_0^{\pi} \frac{dx}{1+2\sin^2 x} =$

A. $\pi/\sqrt{3}$

B. $\pi/3\sqrt{3}$

C. $\pi/3$

D. none of these

Answer: A

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104. $\int \frac{dx}{1+2\sin x+\cos x}$

A. $\log[1+2\tan(x/2)]+c$

B. $\log[1-2\tan(x/2)]+c$

C. $\frac{1}{2}\log[1+2\tan(x/2)]+c$

D. none of these

Answer: C

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105. $\int_0^{\pi/2} \frac{1}{2+\cos x} dx =$

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

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

C. $\log \frac{3}{4}$

D. $\log \frac{4}{3}$

Answer: B

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106. The value of the integral $\int_0^{\pi} \frac{1}{a^2 - 2a\cos x + 1} dx (a < 1)$ is

A. $\frac{\pi}{1-a^2}$

B. $\frac{\pi}{a^2-1}$

C. $\frac{2\pi}{a^2-1}$

D. $\frac{3\pi}{4}$

Answer: A

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107. The value of $\int_3^5 \frac{x^2}{x^2-4}\,dx$ is

A. $2-\log_e(15/7)$

B. $2+\log(15/7)$

C. $2+4\log_e 3-4\log_e 7+4\log_e 5$

D. $2-\tan^{-1}(15/7)$

Answer: B

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108. $\int \frac{x^5 dx}{\sqrt{(1+x^3)}} =$

A. $\frac{2}{3}\sqrt{(1+x^3)}(x^2+2)$

B. $\frac{2}{9}\sqrt{(1+x^3)}(x^3-4)$

C. $\frac{2}{9}\sqrt{(1+x^3)}(x^2+4)$

D. $\frac{2}{9}\sqrt{(1+x^3)}(x^3-2)$

Answer: D

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109. $\int \frac{x^5}{\sqrt{(1+x^2)}} dx =$

A. $\frac{1}{15}\sqrt{(1+x^2)}\left[3x^4+4x^2+8\right]$

B. $\frac{1}{15}\sqrt{(1+x^2)}\left[3x^4-4x^2+8\right]$

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

D. none

Answer: B

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110. $\int \frac{1}{(1+\sqrt{x})\sqrt{x-x^2}}dx$ is equal to

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

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

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

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

Answer: B

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111. The value of $\int_0^1 \sqrt{\frac{1-x}{1+x}}dx$ is

A. $\pi/2+1$

B. $\pi/2-1$

C. -1

D. 1

Answer: B

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112. $\int x\sqrt{\frac{1-x}{1+x}}dx$ =

A. $(x/2-1)\sqrt{(1-x^2)}+\frac{1}{2}\sin^{-1}x$

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

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

D. None

Answer: B

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113. $\int_0^{1/\sqrt{3}} \frac{dx}{(1+x^2)\sqrt{(1-x^2)}}$ = x

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

B. $\frac{\pi}{4\sqrt{2}}$

C. $\pi / (\sqrt{2})$

D. π

Answer: B

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

A. $\log 3$

B. $\log 2$

C. $\frac{1}{20} \log 3$

D. $\frac{1}{20}\log 2$

Answer: C

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115. $\int \frac{\sin\theta + \cos\theta}{\sqrt{(\sin 2\theta)}} d\theta =$

A. $\sin^{-1}(\sin\theta + \cos\theta)$

B. $\sin^{-1}(\sin\theta - \cos\theta)$

C. $\sin^{-1}(\cos\theta - \sin\theta)$

D. none

Answer: B

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116. $\int \frac{\sin x - \cos x}{\sqrt{\sin 2x}} dx =$

A. $\log\{(\sin x + \cos x) + \sqrt{\sin 2x}\}$

B. $-\log\{\sin x + \cos x + \sqrt{\sin 2x}\}$

C. $\log(\sin x - \cos x + \sqrt{\sin 2x})$

D. $-\log[\sin x - \cos x + \sqrt{\sin 2x}]$

Answer: B

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117. $\int_0^{\pi/4} \left[\sqrt{(\tan x)} + \sqrt{(\cot x)}\right] dx =$

A. $\frac{\pi}{\sqrt{2}}$

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

C. $\left(-\frac{3\pi}{\sqrt{2}}\right)$

D. None

Answer: C

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118. $\int_0^{\pi/4} \frac{\sin x + \cos x}{3 + \sin 2x} dx$ is equal to

A. $-\frac{1}{4}\log 3$

B. $\frac{1}{4}\log 3$

C. $-\frac{1}{3}\log 4$

D. none of these

Answer: B

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119. $\int_0^{\pi/2} \frac{(\sin x + \cos x)^2}{\sqrt{1 + \sin 2x}} dx =$

A. 0

B. 1

C. 2

D. 3

Answer: C

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120. Evaluate $\int \sqrt{1+\operatorname{cosec} x}\,dx,\ (\pi/2 < x < \pi)$

A. $\sin^{-1}(\tan x - \sec x)$

B. $\sin^{-1}(\cos x)$

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

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

Answer: D

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121. If $I = \int_0^1 \cos\left\{2\cot^{-1}\sqrt{\frac{1-x}{1+x}}\right\}dx$ then

A. $I > \frac{1}{2}$

B. $I = -\frac{1}{2}$

C. $0 < I < \frac{1}{2}$

D. none of these

Answer: B

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122. If $f(x) = A\sin\left(\frac{\pi x}{2}\right) + B$, $f'\left(\frac{1}{2}\right) = \sqrt{2}$ and $\int_0^1 f(x)dx = \frac{2A}{\pi}$, then the constants A and B are respectively

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

Answer: D

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123. If $f(x) = ae^{2x} + be^{x} + cx$ satisfies the conditions $f(0) = -1, f'(\log 2) = 31, \int_0^{\log 4} [f(x) - cx] = \frac{39}{2}$, then

A. $a = 5$

B. $b = -6$

C. $c = 2$

D. $a = 3$

Answer: A::B

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124. The value of θ in the interval $[-\pi, 0]$ satisfying $\sin\theta + \int_{\theta}^{2\theta} \cos 2x dx = 0$ is

A. $-\pi/2$

B. $-\pi$

C. $-\pi/3$

D. 0

Answer: B::C::D

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125. Evaluate: $\int \frac{1+\cos 4x}{\cot x - \tan x}\, dx$

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

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

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

D. $-\frac{1}{8}\cos 4x + c$

Answer: D

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

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

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

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

D. None of these

Answer: D

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127. $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx$ is equal to

A. $\sin 2x + c$

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

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

D. $-\sin 2x + c$

Answer: B

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128. If $\int \frac{dx}{\sin^6 x + \cos^6 x} = \tan^{-1} f(x)$, then

A. $f(x) = \tan x - \cot x$

B. $f\left(\frac{\pi}{4}\right) = 0$

C. $f(x) = \tan x + \cot x$

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

Answer: A::B

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129. $\int \frac{dx}{\cos^6 x + \sin^6 x}$ is equal to

A. $\tan^{-1}(\tan x - \cot x)$

B. $\tan^{-1}(-2\cot 2x)$

C. $\log(\tan x - \cot x)$

D. $\log(\cot x - \tan x)$

Answer: A::B

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130. $\int \frac{\cos^3 x + \cos^5 x}{\sin^2 x + \sin^4 x} dx =$

A. $\sin x - 2/\sin x - 6\tan^{-1}(\sin x)$

B. $\sin x - 2/\sin x + 5\tan^{-1}(\sin x)$

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

D. none

Answer: A

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

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132. If a be a positive integer, the number of values of a satisfying $\int_0^{\pi/2}\left[a^2\left(\frac{\cos 3x}{4}+\frac{3}{4}\cos x\right)+a\sin x-20\cos x\right]dx \leq -\frac{a^2}{3}$ is

A. only one

B. two

C. three

D. four

Answer: D

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133. $\int a^{a^{a^x}}.a^{a^x}.a^x dx$ is equal to

A. $\frac{a^{a^x}}{(\log a)^3}+c$

B. $a^{a^{a^x}}(\log a)^3+c$

C. $\frac{a^{a^{a^x}}}{(\log a)^3}+c$

D. none of these

Answer: C

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134. Let m be any integer. Then, the integral $\int_0^{\pi}\frac{\sin 2mx}{\sin x}dx$ equals

A. 0

B. π

C. 1

D. none of these

Answer: A

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

A. $1/3$

B. $2/3$

C. $-1/3$

D. $-2/3$

Answer: A

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136. $\int \frac{dx}{\sin(x-a)\sin(x-b)}$ is

A. $\frac{1}{\sin(a-b)}\log\frac{\sin}{\sin}\frac{(x-a)}{(x-b)}$

B. $\frac{1}{\cos(a-b)}\log\frac{\cos}{\cos}\frac{(x-a)}{(x-b)}$

C. $\frac{1}{\sin(a-b)}\log\frac{\cos}{\cos}\frac{(x-a)}{(x-b)}$

D. $\frac{1}{\cos(a-b)}\log\frac{\sin}{\sin}\frac{(x-a)}{(x-b)}$

Answer: A

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137. (i) $\int\frac{1}{\sin(x-a)\cos(x-b)}dx$

(ii) $\int\frac{1}{\cos(x-a)\cos(x-b)}dx$

A. $\frac{1}{\cos(a-b)}\log\frac{\sin(x-a)}{\cos(x-b)}$

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

C. $\frac{1}{\sin(a-b)}\log\frac{\cos(x-a)}{\cos(x-b)}$

D. $\frac{1}{\sin(a-b)}\log\frac{\sin(x-a)}{\sin(x-b)}$

Answer: A::C

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138. $\int \frac{\sin x}{\sin(x-a)} dx =$

A. $x \sin a + \sin a \log \sin(x-a)$

B. $x \cos a + \cos a \log \cos(x-a)$

C. $x \cos a + \sin a \log \sin(x-a)$

D. none

Answer: C

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139. The value of $\int_0^{\pi/2} \text{cosec}\left(x - \frac{\pi}{3}\right) \text{cosec}\left(x - \frac{\pi}{6}\right) dx$ is

A. $2 \log 3$

B. $-2 \log 3$

C. $\log 3$

D. none of these

Answer: B

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140. $\int \frac{\sin 2x}{\sin\left(x-\frac{\pi}{6}\right)\sin\left(x+\frac{\pi}{6}\right)}dx=$

A. $\frac{1}{\sqrt{3}}\left[\log\tan\frac{x}{2}+\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)\right]$

B. $\frac{1}{\sqrt{3}}\left[\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)\right]$

C. $\frac{1}{\sqrt{3}}\left[\log\cot\left(\frac{x}{2}+\frac{\pi}{12}\right)\right]$

D. none

Answer: D

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141. If $f(x)=\begin{vmatrix} 0 & x^2-\sin x & \cos x-2 \\ \sin x-x^2 & 0 & 1-2x \\ 2-\cos x & 2x-1 & 0 \end{vmatrix}$

then $\int f(x)dx$ is equal to

A. $\frac{x^3}{3} - x^2 \sin x + \sin 2x$

B. $\frac{x^3}{3} - x^2 \sin x - \cos 2x$

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

D. c

Answer: D

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142. If $f(x) = \begin{vmatrix} \sin x + \sin 2x + \sin 3x & \sin 2x & \sin 3x \\ 3 + 4\sin x & 3 & 4\sin x \\ 1 + \sin x & \sin x & 1 \end{vmatrix}$ then the value of $\int_0^{\pi/2} f(x)dx$ equals

A. 1

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

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

D. 0

Answer: C

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

A. e^5

B. e^4

C. $3e^2$

D. 0

Answer: D

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144. Let $I_1 = \int_1^2 \frac{1}{\sqrt{1+x^2}}dx$ and $I_2 = \int_1^2 \frac{1}{x}dx$.Then

A. $I_1 > I_2$

B. $I_2 > I_1$

C. $I_1 = I_2$

D. $I_1 > 2I_2$

Answer: B

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145. Let $I_n = \int_0^{\pi/4} \tan^n x dx (n > 0 \text{ and } \in N)$, then

A. $I_n = I_{n-2}$

B. $I_n + I_{n-2} = \frac{1}{n-1}$

C. $I_n - I_{n-2} = \frac{1}{n-1}$

D. none of these

Answer: B

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146. If $u_n = \int_0^{\pi/4} \tan^n x dx$ then

$u_2 + u_4, u_3 + u_5, u_4 + u_6$..... are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: C

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147. If $I_n = \int_0^{\pi/4} \tan^n x dx$, then

A. $I_{10} + I_8 = \frac{1}{9}$

B. $I_5 + I_7 = \frac{1}{6}$

C. $I_{12} + 2I_{10} + I_8 = \frac{20}{99}$

D. $I_6 - I_{12} = \frac{2}{99}$

Answer: A::B::C

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148. The value of $\int_0^{\pi/4} \left(\tan^n x + \tan^{n-2} x\right) d(x - [x])$, [where [.] denotes the greatest integer function) is

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

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

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

D. none of these

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149. If $u_n = \int_0^{\pi/2} \frac{\sin^2 nx}{\sin x} dx$, then

$u_2 - u_1, u_3 - u_2, u_4 - u_3, \ldots$ Are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: C

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150. Let

$I = \int_0^1 \frac{e^x}{x+1} dx$, then the value of the integral

$I_1 = \int_0^1 \frac{xe^{x^2}}{x^2+1} dx$ is

A. I^2

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

C. $2I$

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

Answer: B

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151. If $I_1 = \int_0^{\pi/2} \frac{x}{\sin x} dx$ and $I_2 = \int_0^1 \frac{\tan^{-1} x}{x} dx$, then $\frac{I_1}{I_2}$=

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

B. 1

C. 2

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

Answer: B

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152. Consider the integrals $I_1 = \int_0^1 e^{-y}\cos^2 y dy$

$I_2 = \int_0^1 e^{-y^2}\cos^2 y dy$, $I_3 = \int_0^1 e^{-y^2} dy$

$I_4 = \int_0^1 e^{-\frac{1}{2}y^2} dy$, where $0 < y < 1$. If I be the greatest amongest $I_1, I_2, I_3, ...I_4$ then

A. $I = I_1$

B. $3I = I_2$

C. $I = I_3$

D. $I = I_4$

Answer: D

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153. The value of the integral $\int_0^1 e^{y^2} dy$ is

A. less than e

B. greater than e

C. less than 1

D. greater than 1

Answer: A::D

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154. If $I_1 = \int_e^{e^2} \frac{dx}{\ln x}$ and $I_2 = \int_1^2 \frac{e^x}{x} dx$, then

A. $I_1 = I_2$

B. $2I_1 = I_2$

C. $I_1 = 2I_2$

D. none of these

Answer: A::D

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155. If $I_1 = \int_t^1 \frac{1}{1+x^2}dx$ and $I_2 = \int_1^{1/t} \frac{1}{1+x^2}dx$ for $t > 0$ then

A. $I_1 = I_2$

B. $I_1 > I_2$

C. $I_2 > I_1$

D. none of these

Answer: A

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156. 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

A. $I_1 > I_2$

B. $I_1 < I_2$

C. $I_3 > I_4$

D. $I_3 < I_4$

Answer: A::D

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157. about to only mathematics

A. $I_n = \frac{n\pi}{2}$

B. $I_n = 2\int_0^{\pi/2} \frac{\sin x \cos 2nx}{\sin x} dx$

C. $I_1, I_2, I_3, \ldots, I_n$ is an A.P.

D. $\sin(I_{16}) = 0$

Answer: A::C::D

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158. Match the integral (i), (ii),and (iii) with three solutions (a),(b) and (c) given below

(i) $\int_a^b \frac{1}{\sqrt{(x-a)(b-x)}}dx$

(ii) $\int_a^b \sqrt{(x-a)(b-x)}dx$

(iii) $\int_a^b \sqrt{\frac{x-a}{b-x}}dx$

(a) $\frac{\pi}{8}(b-a)^2$

(b) π

(c) $\frac{\pi}{2}(b-a)$

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159. For $\int \frac{1}{\sqrt{(x-a)(b-x)}}dx$, put $x = a\cos^2 t + b\sin^2 t$

$\int_{\sqrt{\frac{3a^2+b^2}{4}}}^{\sqrt{\frac{a^2+b^2}{2}}} \frac{x}{\left\{\left(\sqrt{x^2-a^2}\right)(b^2-x^2)\right\}}dx$

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

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

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

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

Answer: D

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160. If $\int \frac{\log\left(x+\sqrt{1+x^2}\right)}{\sqrt{1+x^2}}dx = (fog)x + c$ then , the function f and g are respectively

A. $\log\sqrt{1+x^2}+x$

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

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

D. none

Answer: C

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161. $\int \frac{\sin 2x + 2\tan x}{\cos^6 x + 6\cos^2 x + 4} dx =$

A. $2\sqrt{\frac{1+\cos^2 x}{\cos^7 x}}$

B. $\tan^{-1}\frac{1}{\sqrt{2}}\left(\frac{1+\cos^2 x}{\cos^7 x}\right)$

C. $\frac{1}{12}\log\left(1 + \frac{6}{\cos^4 x} + \frac{4}{\cos^6 x}\right)$

D. none

Answer: C

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162. If $\frac{2dx}{[(x-5)+(x-7)]\sqrt{(x-5)(x-7)}} = f[g(x)] + c$, then

A. $f(x) = \sin^{-1} x, g(x) = \sqrt{(x-5)(x-7)}$

B. $f(x) = \sin^{-1} x, g(x) = (x-5)(x-7)$

C. $f(x) = \tan^{-1} x, g(x) = \sqrt{(x-5)(x-7)}$

D. $f(x) = \tan^{-1} x, g(x) = (x-5)(x-7)$

Answer: C

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163. For integration of $\left(x+\sqrt{1+x^2}\right)^n$ use the subtitution $x=\tan\theta$.

Also note that

$(\sec\theta+\tan\theta)(\sec\theta-\tan\theta)=1$

Evaluate the following :

$\int_0^\infty \frac{dx}{\left[x+\sqrt{1+x^2}\right]^n}$, where n is an integer >1

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164. For integration of $\left(x+\sqrt{1+x^2}\right)^n$ use the subtitution $x=\tan\theta$.

Also note that

$(\sec\theta+\tan\theta)(\sec\theta-\tan\theta)=1$

Evaluate the following :

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165. Evaluate the following :

$$\int_0^{\pi/2} \frac{\sec^2 x}{(\sec x + \tan x)^n} dx (n > 1)$$

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PROBLEM SET (1)(TRUE AND FALSE)

1. Let $f: [0, \pi/2] \to R$ such that $f(0) = 3$ and $f'(x) = \frac{1}{1 + \cos x}$,

then

$3 + \frac{\pi}{4} e \leq f\left(\frac{\pi}{2}\right) \leq 3 + \frac{\pi}{2}$ True or False ?

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2. If m and n are integers , then $\int_0^{\pi} \sin mx \sin nx dx = 0$, if $m \neq n$ and

π if $m = n$.

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3. If $S_n = \int_0^{\pi/2} \frac{\sin(2n-1)x}{\sin x} dx$,

$V_n = \int_0^{\pi/2} \left(\frac{\sin nx}{\sin x}\right)^2 dx$

and n is an integer , then

$S_{n+1} - S_n = 0, V_{n+1} - V_n = S_{n+1}$

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4. If $\int(\sin 2x - \cos 2x)dx = \frac{1}{\sqrt{2}}\sin(2x-a) + b$, then the values of a & b are

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5. $\int \frac{3\cos x + 2\sin x}{4\sin x + 5\cos x} dx = ...$

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6. If for non-zero- x $af(x)+bf\left(\frac{1}{x}\right)=\frac{1}{x}-5$ where $a \neq b$, then $\int_1^2 f(x)dx$ =..... .

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PROBLEM SET (1)(FILL IN THE BLANKS)

1. If $\int \frac{1}{1+\sin x}dx=\tan\left(\frac{x}{2}+a\right)+b$ then

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PROBLEM SET (2)(MULTIPLE CHOICE QUESTIONS)

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

A. $2\sqrt{x}-e^{\sqrt{x}}-4\sqrt{x}e^{\sqrt{x}}$

B. $\left(2x-4\sqrt{x}+4\right)e^{\sqrt{x}}$

C. $\left(1-4\sqrt{x}\right)e^{\sqrt{x}}$

D. None

Answer: B

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2. $\int x^3 e^{x^2}$ dx is equal to

A. $x^2\left(e^{x^2}-1\right)$

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

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

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

Answer: C

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3. $\int_0^1 \tan^{-1} x dx =$

A. $\pi/4$

B. $(\pi/4) + \log 2$

C. $(\pi/4) - \frac{1}{2}\log 2$

D. $(\pi/2) + \log 2$

Answer: C

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4. $\int x \frac{(\sec 2x - 1)}{(\sec 2x + 1)} dx =$

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

B. $x \tan x + \log \sec x + \frac{x^2}{2}$

C. $x \sec^2 x + \log \tan x - \frac{x^2}{2}$

D. none

Answer: A

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5. $\int \sin^{-1}\left(\frac{2x}{1+x^2}\right)dx = \int \cos^{-1}\frac{1-x^2}{1+x^2}dx = \int \tan^{-1}\frac{2x}{1-x^2}dx$

A. $2x\tan^{-1}x - \log(1+x^2)$

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

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

D. None of these

Answer: A

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6. $\int \frac{x\tan^{-1}x^2}{(1+x^4)}dx$

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

B. $\frac{1}{3}\left(\tan^{-1}x^2\right)$

C. $\frac{1}{4}\left(\tan^{-1}x^2\right)^2$

D. none

Answer: C

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7. $\int\frac{x^2\tan^{-1}x}{1+x^2}dx=$

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

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

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

D. None of these

Answer: D

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8. $\int \sec^3 x dx =$

A. $\frac{1}{2}[\tan x \sec x + \log(\tan x + \sec x)]$

B. $\frac{1}{2}[\tan x \sec x - \log(\tan x + \sec x)]$

C. $\frac{1}{2}[\tan x \sec x - \log(\sec x - \tan x)]$

D. None of these

Answer: A

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9. $\int x \tan^{-1} x dx =$

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

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

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

D. None of these

Answer: B

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10. $\int x^3 \tan^{-1} x dx =$

A. $\left[(x^4-1)\tan^{-1}x - \frac{x^3}{3} + x\right]$

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

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

D. $\frac{1}{4}\left[(x^4-1)\tan^{-1}x - \frac{x^3}{3} + x\right]$

Answer: D

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11. The value of $\int_0^\infty \frac{x\tan^{-1}x}{(1+x^2)^2}$ dx is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/8$

Answer: D

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12. $\int_1^e \log x dx =$

A. 1

B. -1

C. $+1$

D. 0

Answer: A::C

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13. $\int x \log x dx = ?$

A. $\frac{x^2}{4}[2\log x - 1]$

B. $\frac{x^2}{4}[2\log x + 1]$

C. $\frac{x^2}{2}[\log x - 4]$

D. none

Answer: A

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14. $\int x^n \log x dx =$

A. $\frac{x^{n+1}}{n}[n\log x - 1]$

B. $\frac{x^{n+1}}{n+1}[(n+1)\log x - 1]$

C. $\frac{x^{n+1}}{(n+1)^2}[(n+1)\log x - 1]$

D. none

Answer: C

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15. $\int \frac{\log x}{x^2} dx =$

A. $\frac{1}{x}(\log x + 1)$

B. $-\frac{1}{x}(\log x + 1)$

C. $\frac{1}{x}(\log x - 1)$

D. $\log(x + 1)$

Answer: B

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16. $\int x^3 (\log x)^2 dx$

A. $\frac{1}{32} x^4 \left[8(\log x)^2 + 4\log x - 1\right]$

B. $\frac{1}{32}x^4\left[8(\log x)^2+4\log x+1\right]$

C. $\frac{1}{32}x^4\left[8(\log x)^2-4\log x+1\right]$

D. None of these

Answer: C

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17. If

$$\int\frac{e^{4x}-1}{e^{2x}}\log\left(\frac{e^{2x+1}}{e^{2x-1}}\right)dx=\left(\frac{u^2}{2}\log u-\frac{u^2}{4}\right)-\left(\frac{v^2}{2}\log v-\frac{v^2}{4}\right)$$

then

A. $u=v=e^x+e^{-x}$

B. $u=e^x-e^{-x}, v=e^x+e^{-x}$

C. $u=e^x+e^{-x}, v=e^x-e^{-x}$

D. None of these

Answer: C

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18. The value of $\int \frac{x \sin^{-1} x}{\sqrt{(1-x^2)}}$ dx is

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

B. $x \sin^{-1} x$

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

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

Answer: C

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19. $\int_0^{\pi^2/4} \sin \sqrt{x} dx$ equals to

A. 4

B. 2

C. 1

D. none

Answer: B

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20. $\int \frac{x \tan^{-1} x}{(1+x^2)^{3/2}} dx =$

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

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

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

D. none

Answer: B

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21. $\int x \sin^2 x dx =$

A. $\frac{1}{8}\left[2x^2 - 2x \sin 2x - \cos 2x\right]$

B. $\frac{1}{8}\left[2x^2 + 2x \sin 2x - \cos 2x\right]$

C. $\frac{1}{8}\left[2x^2 - 2x \sin 2x + \cos 2x\right]$

D. None of these

Answer: A

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22. $\int \cos \sqrt{x} dx =$

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

B. $\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}$

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

D. None of these

Answer: A

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23. $\int x^3 \cos x^2 dx =$

A. $\left(x^2 \cos x^2 - \sin x^2\right)$

B. $x^2 \sin x^2 - \cos x^2$

C. $\frac{1}{2}\left[x^2 \sin x^2 - \cos x^2\right]$

D. none

Answer: D

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

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

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

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

D. None

Answer: C

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25. $\int\sin x\log(\sec x+\tan x)dx=$

A. $x+\cos x\log(\sec x+\tan x)$

B. $x-\cos x\log\sec x$

C. $x-\cos x\log(\sec x+\tan x)$

D. None

Answer: C

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26. $\int e^x[f(x)+f'(x)]dx =$

A. $\int e^x f'(x)dx$

B. $e^x f(x)$

C. $e^x f'(x)$

D. None of these

Answer: B

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27. Let I $= \int \frac{e^x}{e^{4x}+e^{2x}+1}dx$, J = $\int \frac{e^{-x}}{e^{-4x}+e^{-2x}+1}dx$. Then for an arbitary constant C, the value of I - J equals

A. $\frac{1}{2}\log\left(\frac{e^{4x}-e^{2x}+1}{e^{4x+e^{2x}}+1}\right)+C$

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

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

D. $\frac{1}{2}\log\left(\frac{e^{4x}+e^{2x}+1}{e^{4x}-e^{2x}+1}\right)$

Answer: C

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28. If $\int e^x[f(x) - f'(x)]dx = \Psi(x)$, then $\int e^x f(x)$ dx is

A. $\Psi(x) + e^x f(x)$

B. $\Psi(x) - e^x f(x)$

C. $\frac{1}{2}[\Psi(x) + e^x f(x)]$

D. $\frac{1}{2}[\Psi(x) + e^x f'(x)]$

Answer: C

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29.

$\int(\sin 3\theta + \sin\theta)e^{\sin\theta}\cos\theta d\theta = e^{\sin\theta}\left[a\sin^3\theta + b\cos^2\theta + c\sin\theta + d\cos\theta +\right.$

then

A. b = 12

B. d = 0

C. b = - 12

D. None

Answer: B::C

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

A. $e^x/(x+1)$

B. $e^x/(x+1)^2$

C. $-e^x/(x+1)$

D. $-e^x/(x+1)^2$

Answer: B

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31. $\int \frac{xe^x}{(x+1)^2} dx =$

A. $e^x/(x+1)$

B. $e^x/(x+1)^2$

C. $-e^x/(x+1)^3$

D. None of these

Answer: A

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

A. $\frac{x}{1+\log x}$

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

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

D. none

Answer: A

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33. $\int \left\{ \frac{\log x - 1}{1 + (\log x)^2} \right\}^2$ dx is equal to

A. $\frac{xe^x}{1 + x^2}$

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

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

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

Answer: B

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34. $\int \frac{x + \sin x}{1 + \cos x} dx$ is equal to

A. $\tan \frac{1}{2}x$

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

C. $\cot \frac{1}{2}x$

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

Answer: B

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35. The value of $\int e^x \left[\frac{1+\sin x}{1+\cos x}\right] dx$ is equal to

A. $e^x \cot \frac{1}{2}x$

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

C. $e^x \tan x$

D. $e^x \cot x$

Answer: B

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36. Evaluate :

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

A. $x\log(\log x)$

B. $x\log(\log x)+x/(\log x)$

C. $x\log(\log x)-x/(\log x)$

D. None of these

Answer: C

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37. $\int e^x[\log(\sec x+\tan x)+\sec x]dx=$

A. $e^x\log\tan x+c$

B. $e^x\log(\sec x+\tan x)+c$

C. $e^x \log \sec x + c$

D. None of these

Answer: B

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38. $\int e^x \sec x(1 + \tan x)dx = ?$

A. $e^x \cos x$

B. $e^x \sec x$

C. $e^x \sin x$

D. $e^x \tan x$

Answer: B

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39. $\int e^{-x}(1-\tan x)\sec x dx$

A. $e^{-x}\tan x$

B. $e^{-x}\sec x$

C. $-e^{-x}\tan x$

D. $-e^{-x}\sec x$

Answer: D

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40. $\int e^{x}\frac{x}{(x+2)^{3}}dx =$

A. $\frac{e^{x}}{(x+2)^{2}}$

B. $\frac{2e^{x}}{(x+2)^{2}}$

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

D. none

Answer: A

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41. If $\int[(1+x)e^x f(x) + xe^x f'(x)]dx = e^x$ then f (x) =

A. 1

B. x

C. $1/x$

D. e^x

Answer: C

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42. $\int 4^x[g'(x) + g(x)\log 4]dx =$

A. $\frac{4^x}{\log 4}g(x)$

B. 4^x

C. $4^x \log 4.\ g(x)$

D. $4^x g(x)$

Answer: D

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

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

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

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

D. none of these

Answer: A

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44. Find the value of the following: $\int_2^3 x^2 dx$

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

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

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

D. None

Answer: B

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45. Evaluate: $\int_0^{\frac{\pi}{4}} \frac{\sec x}{1+2\sin^2 x} dx$

A. $\frac{1}{3}\left[\log\left(\sqrt{2}+1\right)+\frac{\pi}{\sqrt{2}}\right]$

B. $\frac{1}{3}\left[\log\left(\sqrt{2}+1\right)+\frac{\pi}{2\sqrt{2}}\right]$

C. $\frac{1}{3}\left[\log\left(\sqrt{2}+1\right)+\frac{\pi}{4}\right]$

D. none

Answer: A

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46. $\int \frac{1-\cos x}{\cos x(1+\cos x)}dx$

A. $\log(\sec x+\tan x)-2\tan(x/2)$

B. $\log(\sec x+\tan x)+2\tan(x/2)$

C. $\log(\sec x-\tan x)-\tan(x/2)$

D. None

Answer: A

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47. Given that $\int_0^\infty \frac{x^2dx}{(x^2+a^2)(x^2+b^2)(x^2+c^2)}$

A. $\frac{\pi}{60}$

B. $\frac{\pi}{20}$

C. $\frac{\pi}{40}$

D. $\frac{\pi}{80}$

Answer: A

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48. $\int \frac{dx}{(\sin x + \sin 2x)} =$

A. $\frac{1}{6}\log(1-\cos x) + \frac{1}{2}\log(1+\cos x) - \frac{2}{3}\log(1+2\cos x)$

B. $6\log(1-\cos x) + 2\log(1+\cos x) - \frac{2}{3}\log(1+2\cos x)$

C. $6\log(1-\cos x) + \frac{1}{2}\log(1+\cos x) + \frac{2}{3}\log(1+2\cos x)$

D. None

Answer: A

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49. $\int_0^{\pi/2} \frac{\sin x \cos x}{\cos^2 x + 3\cos x + 2} dx =$

A. $\log(9/8)$

B. $\log(8/9)$

C. $\log(3/4)$

D. None of these

Answer: A

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50. $\int \frac{\cos^3 x + \cos^5 x}{\sin^2 x + \sin^4 x} dx =$ (A) $\sin x - 6\tan^{-1}(\sin x) + c$ (B) $\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x) + c$ (C) $\sin^{-1} x - 2(\sin x)^{-1} + 5\tan^{-1}(\sin x) + c$ (D) none of these

A. $\sin x - \frac{2}{\sin x} + 5\tan^{-1}(\sin x)$

B. $\sin x - 6\tan^{-1}(\sin x)$

C. $\sin x - \frac{2}{\sin x}$

D. $\sin x - \frac{2}{\sin x} - 6\tan^{-1}(\sin x)$

Answer: D

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51. $\int_0^{64} \left[\left\{x^{1/3}\right\} - \left\{\sqrt{x}\right\}\right] dx = \ldots\ldots$

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52. $\int_0^{\pi/2} \frac{\cos^2\theta d\theta}{\cos^2\theta + 4\sin^2\theta} =$

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

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

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

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

Answer: B

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53. $\int \frac{\sin^{-1}\sqrt{x} - \cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x}} dx =$

A. $\frac{2}{\pi}\left[\sqrt{(x - x^2)} + (1 - 2x)\sin^{-1}\sqrt{x}\right] + x$

B. $\frac{2}{\pi}\left[\sqrt{(x - x^2)} - (1 - 2x)\sin^{-1}\sqrt{x}\right] - x$

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

D. None

Answer: B

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54. $\int [f(x)g''(x) - f''(x)g(x)]$ dx is equal to

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

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

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

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

Answer: C

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55. The value of the integral $\int_1^e (\log x)^3 \, dx$ is

A. $6 + 2e$

B. $6 - 2e$

C. $2e - 6$

D. none of these

Answer: B

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56. $I_{m,n} = \int_0^1 x^m (\log x)^n dx =$

A. $\frac{n}{n+1} I_{m,n-1}$

B. $-\frac{m}{n+1} I_{m,n-1}$

C. $-\frac{n}{m+1} I_{m,n-1}$

D. $\frac{m}{n+1} I_{m,n-1}$

Answer: C

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57. If $I(m,n) = \int_0^1 t^m (1+t)^n dt, m, n, \in R$, then I (m,n) is

A. $\frac{n}{1+m} I[(\mathrm{m}+1), (n-1)]$

B. $\frac{m}{n+1} I[(\mathrm{m}+1), (n-1)]$

C. $\frac{2^n}{1+m} - \frac{n}{1+m} I[(\mathrm{m}+1), (n-1)]$

D. $\frac{2^n}{1+m} - \frac{m}{1+n} I[(\mathrm{m}+1), (n-1)]$

Answer: C

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58. The solution of the equation $\int_{\log_2}^{x} \frac{1}{e^x - 1} dx = \frac{\log(3)}{2}$ is given by x=

A. e^2

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

C. $\log 4$

D. none

Answer: C

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59. Evaluate $\int \frac{1}{(e^x - 1)^2} dx.$

A. $x + \log(e^x - 1) + \frac{1}{e^x - 1}$

B. $x - \log(e^x - 1) + \frac{1}{e^x - 1}$

C. $x + \log(e^x - 1) - \frac{1}{e^x - 1}$

D. none

Answer: B

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60. $\int_0^\infty \frac{1}{1 + e^x} dx =$

A. $\log 2 - 1$

B. $\log 2$

C. $\log 4 - 1$

D. $-\log 2$

Answer: B

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61. $\int \frac{1}{x(x^n+1)}dx =$

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

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

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

D. none

Answer: B

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62. $\int \frac{1}{x(x^3+1)}dx =$

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

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

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

D. none

Answer: C

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63. $\int \frac{1}{x\sqrt{(1+x^n)}}dx =$

A. $\log \frac{\sqrt{(1+x^n)}-1}{\sqrt{(1+x^n)}+1}$

B. $\log \frac{\sqrt{(1+x^n)}+1}{\sqrt{(1+x^n)}-1}$

C. $\frac{1}{n}\log \frac{\sqrt{(1+x^n)}-1}{\sqrt{(1+x^n)}+1}$

D. none

Answer: C

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64. Evaluate $\int \frac{1}{x\sqrt{1+x^3}}dx$

A. $\log \frac{\sqrt{1+x^3}-1}{\sqrt{1+x^3}+1}$

B. $\frac{1}{2}\log\frac{\sqrt{1+x^3}-1}{\sqrt{1+x^3}+1}$

C. $\frac{1}{3}\log\frac{\sqrt{1+x^3}-1}{\sqrt{1+x^3}+1}$

D. none

Answer: C

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

A. $\frac{1}{4}(e-7)$

B. $\frac{1}{4}(e-2)$

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

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

Answer: D

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66. If $\int g(x)dx = g(x)$, then $\int (f(x) + f'(x))g(x)dx$ is equal to

A. $f(x)g(x)$

B. $f'(x)g(x)$

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

D. $f(x)g'(x)$

Answer: A

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67. $\int \frac{x^2 dx}{(x\sin x + \cos x)^2} =$

A. $\frac{\sin x + \cos x}{x\sin x + \cos x}$

B. $\frac{x\sin x + \cos x}{x\sin x - \cos x}$

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

D. None

Answer: D

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68. $\int_0^{\pi/4} \left(\frac{x^2}{(x \sin x + \cos x)^2} \right) dx$

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

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

C. $\frac{4-\pi}{3+\pi}$

D. $\frac{3+\pi}{4-\pi}$

Answer: A

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69. $\int_{-1}^{\frac{1}{2}} \frac{e^x(2-x^2)dx}{(1-x)\sqrt{1-x^2}} isequa < o \ \frac{\sqrt{e}}{2}(\sqrt{3}+1)$ (b) $\frac{\sqrt{3e}}{2}$ $\sqrt{3e}$ (d) $\sqrt{\frac{e}{3}}$

A. $\frac{\sqrt{e}}{2}(\sqrt{3}+1)$

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

C. $\sqrt{3e}$

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

Answer: C

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70. $\int \frac{\sqrt{x^2+1}\left[\log\left(x^2+1\right)-2\log x\right]}{x^4} dx$ is equal to

A. $\frac{1}{3}\left(1+\frac{1}{x^2}\right)^{1/2}\left[\log\left(1+\frac{1}{x^2}\right)+\frac{2}{3}\right]+c$

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

C. $\frac{2}{3}\left(1+\frac{1}{x^2}\right)^{3/2}\left[\log\left(1+\frac{1}{x^2}\right)+\frac{2}{3}\right]+c$

D. none of these

Answer: B

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71. $\int \frac{x^4 - 1}{x^2(x^4 + x^2 + 1)^{\frac{1}{2}}} dx$ is equal to

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

B. $\frac{\sqrt{x^4 + x^2 + 1}}{x}$

C. $\sqrt{\frac{x^4 + x^2 + 1}{x}}$

D. none of these

Answer: A::B

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72. $\int \frac{x^2-1}{x^3\sqrt{2x^4-2x^2+1}} dx is equa < o \quad \frac{\sqrt{2x^4-2x^2+1}}{x^3}+C$ (b) $\frac{\sqrt{2x^4-2x^2+1}}{x}+C \quad \frac{\sqrt{2x^4-2x^2+1}}{x^2}+C$ (d) $\frac{\sqrt{2x^4-2x^2+1}}{2x^2}+C$

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

B. $\frac{\sqrt{2x^4-2x^2+1}}{x^3}+c$

C. $\frac{\sqrt{2x^4-2x^2+1}}{x^2}+c$

D. $\frac{\sqrt{2x^4-2x^2+1}}{2x^2}+c$

Answer: D

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73. $\int \cos\left(b\log\frac{x}{a}\right)dx =$

A. $\frac{x}{1+b^2}\left[b\cos\left(b\log\frac{x}{a}\right)+\sin\left(b\log\frac{x}{a}\right)\right]$

B. $\frac{x}{1+b^2}\left[\cos\left(b\log\frac{x}{a}\right)+b\sin\left(b\log\frac{x}{a}\right)\right]$

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

D. $\frac{x}{4b^2}\left[a\cos\left(b\log\frac{x}{a}\right)+\sin\left(b\log\frac{x}{a}\right)\right]$

Answer: B

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74. $\int e^{ax}\cos bx dx =$

A. $\frac{e^{ax}}{r}\cos(bx-\alpha)$

B. $\frac{e^{ax}}{r}\cos(bx+\alpha)$

C. $\frac{e^{ax}}{r}\sin(bx-\alpha)$

D. $\frac{e^{ax}}{r}\sin(nx+\alpha)$

Answer: A

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75. If $I_m=\int_1^e(\log x)^m dx$, then I_m+I_{m-1} =

A. me

B. 2e

C. 3e

D. e

Answer: D

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76. If $I_n = \int_0^{\pi/2} x^n \sin x dx$ and $n > 1$ then $I_n + n(n-1)I_{n-2}$ is equal to

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

B. $(n-1)\left(\frac{\pi}{2}\right)^n$

C. $n\left(\frac{\pi}{2}\right)^{n-1}$

D. $(n-1)\left(\frac{\pi}{2}\right)^{n-1}$

Answer: C

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77. If $I_{10} = \int_0^{\pi/2} x^{10} \sin x \, dx$ then the value of $I_{10} + 90I_8$ is

A. $9\left(\frac{\pi}{2}\right)^6$

B. $\left(\frac{\pi}{2}\right)^9$

C. $10\left(\frac{\pi}{2}\right)^9$

D. $9\left(\frac{\pi}{2}\right)^9$

Answer: C

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78. $\int xe^x \cos x \, dx$ is equal to

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

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

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

D. None of these

Answer: D

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79. If $u_n = \int_0^{\pi/2} \cos^n x \cos nx dx$, then $\frac{u_n}{u_{n+1}}$ =

A. 3

B. $2/3$

C. 2

D. $3/4$

Answer: C

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80. Evaluate: $5050\frac{\int 01(1-x^{50})^{100}dx}{\int 01(1-x^{50})^{101}dx}$

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PROBLEM SET (2)(FILL IN THE BLANKS)

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

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SELF ASSESSMENT TESET

1. $\int\frac{\sin x}{\sin(x-\alpha)}dx=$

A. $x\cos\alpha-\sin\alpha\log\sin(x-\alpha)+c$

B. $x\cos\alpha+\sin\alpha\log\sin(x-\alpha)+c$

C. $x \sin\alpha - \sin\alpha \log \sin(x - \alpha) + c$

D. none of these

Answer: B

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

A. $\frac{1}{4}\left(\cos\frac{\pi}{4} - \sin\frac{x}{4}\right) + c$

B. $4\left(\cos\frac{\pi}{4} - \sin\frac{x}{4}\right) + c$

C. $4\left(\sin\frac{x}{4} - \cos\frac{x}{4}\right) + c$

D. none of these

Answer: C

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3. $\int \frac{dx}{\sin x + \cos x} =$

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

B. $\log \tan\left(\frac{\pi}{8} - \frac{x}{2}\right) + c$

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

D. none of these

Answer: C

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4. $\int (\sqrt{1 + \cos x} dx$ equals

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

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

C. $-2\sqrt{2} \cos \frac{x}{2} + c$

D. none of these

Answer: A

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5. $\int \frac{1}{(x-5)^2} dx =$

A. $\frac{1}{x-5} + c$

B. $\frac{-1}{x-5} + c$

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

D. none of these

Answer: B

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6. $\int \frac{(x+1)e^x}{\cos^2(xe^x)} dx = ?$

A. $\tan(xe^x) + c$

B. $\sec(xe^x)\tan(xe^x)+c$

C. $-\tan(xe^x)+c$

D. none of these

Answer: A

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7. $\int \frac{1}{\sqrt{1-e^{2x}}}dx$

A. $x-\log\left[1+\sqrt{1-e^{2x}}\right]+c$

B. $x+\log\left[1+\sqrt{1-e^{2x}}\right]+c$

C. $\log\left[1+\sqrt{1-e^{2x}}\right]-x+c$

D. none of these

Answer: A

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8. If $\int f(x)dx = g(x)$, then $\int x^5 f(x^3)$ dx is equal to

A. $\frac{1}{3}\left[x^3 g(x^3) - \int x^2 g(x^3)dx\right] + c$

B. $\frac{1}{3}x^3 g(x^3) - 3\int x^2 g(x^3)dx + c$

C. $\frac{1}{3}x^3 g(x^3) - \int x^2 g(x^3)dx + c$

D. none of these

Answer: C

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9. If the integral $\int \frac{5\tan x}{\tan x - 2}dx = x + a\log|\sin x - 2\cos x| + c$, then a is equal to

A. -1

B. -2

C. 1

D. 2

Answer: D

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

A. $\frac{-1}{(\sec x + \tan x)^{11/2}} \left\{ \frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2 \right] + k$

B. $\frac{1}{(\sec x + \tan x)^{11/2}} \left\{ \frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2 \right] + k$

C. $\frac{-1}{(\sec x + \tan x)^{11/2}} \left\{ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2 \right] + k$

D. $\frac{1}{(\sec x + \tan x)^{11/2}} \left\{ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2 \right] + k$

Answer: C

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