MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

INDEFINITE INTEGRATION

Solved Examples Concept Based Single Correct Answer Type Questions

1. If f(x) = $\frac{\log x}{x^3}$ = then its antiderivative F(x) given by

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

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

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

D. $C + \frac{1}{2x^3}\log(xe)$

Answer: A

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2. The value of $\int \frac{1+\sin x}{1-\sin x} dx$

A. $2\tan\left(\frac{x}{2}+\frac{\pi}{4}\right)+C$

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

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

D. $2\tan^2\left(\frac{x}{\pi}/(4)\right)-X+C$

Answer: C

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3. The value of $\int \frac{dx}{\sqrt{4x-3-x^2}}$ is equal to

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

B. $\log\left|(x-2)+\sqrt{4x-3-x^2}\right|$

C. $\log\left|(x-1)+\sqrt{4x-3-x^2}\right|+C$

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

Answer: D

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

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

B. $\frac{x^3}{3}-x+\tan^{-1}+C$

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

D. $\frac{x^3}{3}-x-\tan^{-1}x+C$

Answer: B

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5. If $\int \frac{2x - \sqrt{\sin^{-1} x}}{\sqrt{1-x^2}} dx = C - 2\sqrt{1-x^2} - \frac{2}{3}\sqrt{f(x)}$ then f(x) is equal to

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

B. $2\sin^{-1} x$

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

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

Answer: C

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6. If $\int \frac{dx}{1 + 3\sqrt{x+1}} = \frac{3}{2}(x+1)^{2/3} - 3(x+1)^{1/3} + f(x) + C$ then f(x) is equal to

A. $\log\left|1 + 3\sqrt{x+1}\right|$

B. $3\log\left|1 + 3\sqrt{x+1}\right|$

C. $\frac{2}{3}\log|1+3\sqrt{x+1}|$

D. $\frac{1}{3}\log|1+3\sqrt{x+1}|$

Answer: B

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7. An antiderivature of the intergral $\int e^x\left(\frac{1-x}{1+x^2}\right)^2 dx$ is

A. $e^x(1-x)$

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

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

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

Answer: D

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8. $\int \frac{3^{x+1} - 7^{x-1}}{21^x} dx = K_1 3^{-x} + K_2 7^{-x} + C$

A. $K_1 = \frac{1}{7\log 3}, K_2 = \frac{1}{3\log 7}$

B. $K_1 = \frac{1}{\log 3}, K_2 = -\frac{1}{3\log 7}$

C. $K_1 = \frac{1}{7\log 3}, K_2 = -\frac{3}{\log 7}$

D. $K_1 = \frac{3}{\log 7}, K_2 = \frac{-7}{\log 7}$

Answer: C

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9. If $\int \cos x \cos 2x \cos 3x dx = A_1 \sin 2x + A_2 \sin 4x + A_3 \sin 6x + C$ then

A. $A_1 = \frac{1}{2}, A_2 = \frac{1}{4}$

B. $A_1 = \frac{1}{4}, A_2 = \frac{1}{8}$

C. $A_2 = \frac{1}{16}, A_3 = \frac{1}{8}$

D. $A_1 = \frac{1}{8}, A_3 = \frac{1}{24}$

Answer: D

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10. If $\int \frac{dx}{1+e^x} = x + K\log(1+e^x) + C$ then K is equal to

A. 1

B. -1

C. 2

D. -2

Answer: B

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Solved Example Level 1 Single Correct Answer Type Question

1. For the function $f(x) = 1 + 3^x \ln 3$ find the antiderivative F(x), which assumes the value 7 for $x = 2$. At what values of x does the curve $F(x)$ cut the x-axis?

A. 0

B. 1

C. 2

D. 3

Answer: B

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2. If f(x) = $\frac{1}{\cos^2 x \sqrt{1 + \tan x}}$ then its antiderivative F(x) (given that F(0) = (4) is

A. $\sqrt{1 + \tan x} + 4$

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

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

D. none of these

Answer: C

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3. Let $f(x)=\frac{1}{4-3\cos^2 x+5\sin^2 x}$ and if its antiderivative $F(x)=\left(\frac{1}{3}\right)\tan^{-1}(g(x))+C$ then $g(x)$ is equal to

A. 3 tan x

B. $\left(\sqrt{2}\right)$ tan x

C. 2 tan x

D. none of these

Answer: B

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4. Let f(x) = $\frac{\sqrt{\tan x}}{\sin x \cos x}$ and $F(x)$ is its antiderivative , if $F(\pi/4) = 6$ then F(x) is equal to

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

B. $2\left(\sqrt{\tan x}+3\right)$

C. $2\left(\sqrt{\tan x}+2\right)$

D. none of these

Answer: C

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5. The value of $\int \frac{dx}{x^4+5x^2+4}$ is

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

B. $3\tan^{-1}(x/3)+2\tan^{-1}(x/2)+C$

C. $(1/3)\tan^{-1}x+(1/6)\tan^{-1}(x/2)+C$

D. $(1/3)\tan^{-1}x-(1/6)\tan^{-1}(x/2)+C$

Answer: D

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6. $\int \frac{(x-1)^2}{(x^2+1)^2} dx = \tan^{-1} x + g(x) + c$ then $g(x) =$

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

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

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

D. none of these

Answer: B

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7. If $\int \frac{\sin x}{\sin^2 x + 4\cos^2 x} dx = \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{g(x)}{\sqrt{3}}\right) + c$ then $g(x) = \ldots.$

A. sec x

B. tan x

C. sin x

D. cos x

Answer: A

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8. If $\int \frac{x}{x^2 - 4x + 8} dx = K \log\left(x^2 - 4x + 8\right) + \tan^{-1}\left(\frac{x - 2}{2}\right) + C$ then the value of K is

A. 1\2

B. 1

C. 2

D. none of these

Answer: A

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9. The value of $\int \frac{dx}{x\sqrt{1-x^3}}$ is equal to

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

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

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

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

Answer: B

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10. $\int \frac{\cos 4x-1}{\cot x-\tan x}dx$ 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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11. $\int e^{\tan^{-1}x}\left[\frac{1+x+x^2}{1+x^2}\right]dx$

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

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

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

D. none of these

Answer: C

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12. $\int\frac{dx}{\sqrt{2-3x-x^2}}=fog(x)+C$ then

A. $f(x) = \sin^{-1} x, g(x) = \dfrac{2x-3}{\sqrt{17}}$

B. $f(x) = \tan^{-1} x, g(x) = \dfrac{2x-3}{\sqrt{17}}$

C. $f(x) = \sin^{-1} x, g(x) = \dfrac{2x+3}{17}$

D. none of these

Answer: C

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13. If $\int \dfrac{dx}{x\sqrt{5x^2-3}} = K\tan^{-1} f(x) + C$ then

A. $f(x) = \sqrt{\dfrac{5}{3}x^2 - 1}, K = \dfrac{1}{\sqrt{5}}$

B. $f(x) = \sqrt{\dfrac{5}{3}x^2 - 1}, K = \dfrac{1}{\sqrt{3}}$

C. $f(x) = \dfrac{1}{2}\sqrt{5x^2-3}, K = \dfrac{1}{\sqrt{5}}$

D. none of these

Answer: B

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14. The value of $\int \frac{\cos 2x}{\cos x + \sin x} dx$ is

A. $\sin x - \cos x + C$

B. $-\sin x + \cos x + C$

C. $\sin x + \cos x + C$

D. none of these

Answer: C

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15. If $\int \frac{\cos 4x + 1}{\cot x - \tan x} = K \cos 4x + C$, then

A. $K = -\frac{1}{2}$

B. $K = -\frac{1}{8}$

C. $K = -18$

D. none of these

Answer: B

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

A. $\log|\tan x| + C$

B. $e^x \tan x/2 + C$

C. $e^x \cot x + C$

D. $\sin \log x + C$

Answer: B

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17. If $\int \sqrt{1+\sec x} dx = K \sin^{-1}(f(x)) + C$ then

A. $f(x) = \sqrt{2}\sin(x/2)$

B. $f(x) = \sqrt{2}\cos(x/2), K = 2$

C. $f(x) = \sqrt{2}\tan(x/2), K = 2$

D. $f(x) = \sqrt{2}\sin(x/2), K = \sqrt{2}$

Answer: A

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18. The antiderivative of $f(x) = \log(\log x) + \frac{1}{(\log x)^2}$ whose graph passes through (e,e) is

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

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

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

D. none of these

Answer: C

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19. $\int \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x} (a, b > 0)$ is equal to

A. $\sin^{-1}((a/b)\tan x) + C$

B. $\tan^{-1}((b/a)\tan x) + C$

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

D. none of these

Answer: C

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20. $f(x) = (1/2)(x^2 - 1)$

A. g(x) = log x

B. L = 1

C. none of these

D.

Answer: A

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

A. $f(x) = (1/3)\left(\left(1-x^2\right)^{3/2}+7\right)$

B. $f(x) = (3/2)\left[\sin^{-1}x+6\right]$

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

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

Answer: C

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22. The value of $\int \frac{\sin\alpha}{\sqrt{1+\cos\alpha}}d\alpha$ is

A. $2\sqrt{2}\cos\left(\frac{\alpha}{2}\right)+C$

B. $-2\sqrt{2}\cos(\alpha/2)+C$

C. $\sqrt{2}\cos(\alpha/2)+C$

D. $-\sqrt{2}\cos(\alpha/2)+C$

Answer: B

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23. The value of $\int \frac{dx}{5+4\cos x}$ is

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

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

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

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

Answer: D

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24. $\int \frac{dx}{x(x^4+1)}$ is equal to

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

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

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

D. none of these

Answer: B

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

A. $\log\tan(\pi/4)+x/8)+C$

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

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

D. $\sqrt{2}\log\tan\left(\frac{x}{4}-\frac{\pi}{8}\right)+C$

Answer: C

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26. The primitive of $\frac{1}{(x-a)^{3/2}(b-x)^{1/2}}$ is

A. $\frac{1}{b-a}\left[\frac{b-x}{x-a}\right]^{1/2}+C$

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

C. $\frac{1}{b-a}\left[\frac{x-a}{b-a}\right]^{1/2}+C$

D. none of these

Answer: D

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27. If f(x) is the primitive of $\frac{\sin 3\sqrt{x}\log(1+3x)}{\left(\tan^{-1}\sqrt{x}\right)^2\left(e^{3\sqrt{x}}-1\right)}(x \neq 0)$ then $\lim_{x\to 0}$ f'(x) is

A. 0

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

C. $\frac{5}{3}$

D. none of these

Answer: D

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28. If the primitive of f(x) = $\frac{1}{3\sin x+\sin^3 x}$ is equal to $f(x)=\frac{1}{3\sin x+\sin x}$ is equal to $\frac{1}{6}\log\left|\frac{t-1}{t+1}\right|+\frac{1}{12}\log\left|\frac{2+t}{2-t}\right|+C$ them

A. t = cos x

B. t = tan x/2

C. t = 2 cos x

D. t = sin x

Answer: A

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29. The value of $\int \frac{\cos x}{\sin x + \cos x} dx$ is

A. $\frac{x^2}{2} + \log|\sin x + \cos x| + C$

B. $\frac{1}{2}(x + \log|\sin x + \cos x|) + C$

C. $2\log|\sin x + \cos x| + x + C$

D. none of these

Answer: B

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30. If the primitive of $\frac{1}{(e^x-1)^2}$ is $f(x)-\log|g(x)|+C$ then

A. dom f = R

B. $g(x)=1-e^x$

C. $domf=\text{~}\{0\}$

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

Answer: C

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31. If $\frac{dx}{\sin^4 x+\cos^4 x}=\frac{1}{\sqrt{2}}\tan^{-1} f(x)+C$

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

B. $f(\pi/4)=0$

C. f(x) is continous on R

D. $f(x)=\frac{1}{2}(\tan x-\cot x)$

Answer: B

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32. The $1\int\frac{\sin^2 x}{\cos^6 x}dx$ is a

A. is a polynomial of degree 5 in sin x

B. is a polynomial of degree 4 in tan x

C. is a polynomial of degree 5 in tan x

D. is a polynomial of degree 5 in cos x

Answer: C

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33. If $\int\tan^7 x dx = f(x) + C$ then

A. f(x) is a polynomial of degree 8 in tan x

B. f(x) is a polynomial of degree 5 in tan x

C. $f(x) = \frac{1}{6}\tan^6 x - \frac{1}{4}\tan^4 x + \frac{1}{2}\sec^2 x + \log|\cos x| + C$

D. f(x) is a polynomial of degree 6 in tan x

Answer: C

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34. If $\int \frac{dx}{\sin x \cos x} = \log|f(x)| + C$ then

A. f(x) = sin x + cos x

B. f(x) = tan x

C. f (x) = $\sec^2 x$

D. none of these

Answer: B

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35. If polynomials P and Q satisfy $\int[(3x-1)\cos x+(1-2x)\sin x]dx = P\cos x + Q\sin x$(ignore the constant of integration) then :

A. P = 3x - 2

B. Q = 2 + X

C. P = 3 (x-1)

D. Q = 3 (x-1)

Answer: D

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36. Let f(x) $= \int e^{x^2}(x-2)(x-3)(x-4)dx$ then f increases on

A. $(-\infty, 2)$

B. $(2, \infty)$

C. $(2, 3)$

D. $(3, \infty)$

Answer: C

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

A. $\frac{\sqrt{2x^4 - 2x^2 + 1}}{x^2} + C$

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

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

D. $\frac{\sqrt{2x^4 - 2x^2 + 1}}{2x^2} + C$

Answer: D

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

Answer: B

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39. The value of $\sqrt{2}\int \frac{\sin x}{\sin\left(x - \frac{\pi}{4}\right)} dx$, is

A. $x + \log|\cos(x - \pi/4)| + C$

B. $x - \log|\sin(x - \pi/4)| + C$

C. $x + \log|\sin(x - \pi/4)| + C$

D. $x - \log|\cos(x - \pi/4)| + C$

Answer: C

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40. If $\int\left[\log(\log x) + \frac{1}{(\log x)^2}\right]dx$

=x[f(x) - g(x)] + C, then :

A. $f(x) = \log(\log x), g(x) = \frac{1}{\log x}$

B. $f(x) = \log x, g(x) = \frac{1}{\log x}$

C. $f(x) = \frac{1}{\log x}, g(x) = \log(\log x)$

D. $f(x) = \frac{1}{x\log x}, g(x) = \frac{1}{\log x}$

Answer: A

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41. If $f\left(\frac{3x-4}{3x+4}\right) = x+2$, then $\int$ f(x)dx is equal to

A. $e^x + 2\log\left|\frac{3x-4}{3x+4}\right| + c$

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

C. $\frac{8}{3}\log|1-x| + \frac{x}{3} + c$

D. $e^{[(3x-4)(3x+4)]} - \frac{x^2}{2} - 2x + c$

Answer: B

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42. $\int \cos\left\{2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right\}dx$ is equal to

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

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

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

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

Answer: A

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43. If $u = -f''(\theta)\sin\theta + f'(\theta)\cos\theta$ and $v = f''(\theta)\cos\theta + f'(\theta)\sin\theta$,then $\int\left[\left(d\frac{u}{d\theta}\right)^2 + \left(\frac{dy}{d\theta}\right)^2\right]^{\frac{1}{2}} d\theta$ is equal to

A. $f(\theta) - f''(\theta) + C$

B. $f(\theta) + f''(\theta) + C$

C. $f'(\theta) + f''(\theta) + C$

D. $f'(\theta) - f''(\theta) + C$

Answer: B

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44. If the integral $\int \frac{5\tan x}{\tan x - 2} dx = x + a\ln|\sin x - 2\cos x| + k$, then a is equal to:

A. -2

B. 1

C. 2

D. 1

Answer: C

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45. $I = \int \frac{\sin^{10} x - \cos^8 x \sin^2 x + \sin^8 x \cos^2 x - \cos^{10} x}{1 - 2\sin^2 x \cos^2 x}$ dx is equal to

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

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

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

D. $-\sin^2 x + C$

Answer: B

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46. The integral

$$I = \frac{\sin^2 x \cos^2 x}{\left(\sin x + \cos^3 x \sin^2 x + \sin^3 x \cos^2 x + \cos^5 x\right)^2}$$ is equal to

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

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

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

D. $-\frac{1}{3\left(1 + \tan^3\right)} + C$

Answer: D

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Solved Example Level 2 Single Correct Answer Type Question

1. If $\int \frac{dx}{x^3(x-1)^{1/2}} = \frac{\sqrt{x-1}(3x+2)}{4x^2} + K\tan^{-1}\sqrt{x+1} + C$ then the value of K is

A. $1/2$

B. 1

C. $1/4$

D. $3/4$

Answer: D

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2. The value of $\int \frac{dx}{\sqrt{x}+\sqrt[3]{x}}$ is

A. $\sqrt[3]{x} + 3\left(\sqrt[3]{x}\right) - 6\left(\sqrt[6]{x}\right) + 6\log\left(\sqrt[6]{x}+1\right) + C$

B. $2\sqrt{x} + \sqrt[3]{x} - 6\log\left(\sqrt[6]{x+1}\right) + C$

C. $2\sqrt{x} - 3\sqrt[3]{x} + 6\sqrt[6]{x} - 6\log\left(\sqrt[6]{x} + 1\right) + C$

D. none of these

Answer: C

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3. $\int \frac{x^5 + x^4 + 4x^3 + 4x^2 + 4x + 4}{\left(x^2 + 2\right)^5}$ is equal to

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

B. $\frac{1}{12}\frac{2x - 3}{\left(x^2 + 2\right)^2} + \frac{3}{16}\frac{x}{x^2 + 2} + \frac{3}{16\sqrt{2}}\tan^{-1}\frac{x}{\sqrt{2}} + C$

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

D. none of these

Answer: D

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4. If $\int \frac{x \tan^{-1}}{\sqrt{1+x^2}} dx =$
$\sqrt{1+x^2} f(x) + K \log\left(x + \sqrt{x^2+1}\right) + C$ then

A. $f(x) = \tan^{-1} x, K = -1$

B. $f(x) = \tan^{-1} x, K = 1$

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

D. $f(x) = 2\tan^{-1} x, K = 1$

Answer: A

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5. The value of $\int \frac{\sin x}{\sin 4x}$ dzx is

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

B. $\frac{1}{8}\log\left|\frac{\cos x - 1}{\cos x + 1}\right| - \frac{1}{2\sqrt{2}\log}\left|\frac{\sqrt{2}\cos x - 1}{\sqrt{2}\sin x + 1}\right| + C$

C. $\frac{1}{8}\log\left|\frac{\sin x - 1}{\sin x + 1}\right| - \frac{1}{4\sqrt{2}}\log\left|\frac{\sqrt{2}\sin x - 1}{\sqrt{2}\sin x + 1}\right| + C$

D. none of these

Answer: C

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

$= K \log f(x) + C$ them

A. $K = -\frac{1}{\sqrt{3}}, f(x)$

$= \frac{5-x}{\sqrt{23}(x+1)} + \sqrt{\left(\frac{5-x}{\sqrt{23}(x+1)}\right)^2 + \frac{23}{16}}$

B. $K = \frac{1}{\sqrt{3}} f(x) = \frac{4-x}{x+1} + \sqrt{\left(\frac{4-x}{(x_+1)}\right)^2 + \frac{23}{16}}$

C. $K = 2, f(x) = y + \sqrt{y^2+1}, y\frac{5-x}{x+1}$

D. none of these

Answer: D

View Text Solution

7. If $\int \frac{dx}{(1+x^2)\sqrt{1-x^2}} = F(x)$ and $F(1) = 0$, then for $x > 0$, $f(x)$ is equal to

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

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

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

D. none of these

Answer: B

View Text Solution

8. Let f (x) be a polynomial of degree three such that f(0) = 1, f(1) = 2 and 0 is a critical point of f(x) such that f(x) does not have a local extremum at 0. Them $\int \frac{f(x)}{x^2+1}$ dx is equal to

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

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

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

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

Answer: D

View Text Solution

9. If $= \int \frac{\log\left(x+\sqrt{1+x^2}\right)}{\sqrt{1+x^2}} dx = gof(x)x$Const. then

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

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

C. $f(x) = \log\left(x+\sqrt{x^2+1}\right)$ and $g(x) = x^2/2$

D. $f(x) = x^2$ and $g(x) = \log\left(x+\sqrt{x^2+1}\right)$

Answer: C

View Text Solution

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

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

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

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

D. none of these

Answer: D

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11. If f(x) = $\frac{x+2}{2x+3}$. Then $\int \left(\frac{f(x)}{x^2}\right)^{1/2} dx$ is equal to $\frac{1}{\sqrt{2}} g\left(\frac{1+\sqrt{2}f(x)}{1-\sqrt{2f(x)}}\right) - \sqrt{\frac{2}{3}} h\left(\frac{\sqrt{3f(x)}+\sqrt{2}}{\sqrt{3f(x)}-\sqrt{2}}\right) + C$ where

A. $g(x) = \tan^{-1} x, h(x) = \log|X|$

B. $g(x) - \log|x|, h(x) = \tan^{-1} x$

C. $g(x) = h(x) = \tan^{-1} x$

D. $g(x) = \log|x|, h(x) = \log|x|$

Answer: D

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12. The value of $\int \frac{\sec x dx}{\sqrt{\sin(2x+\theta)+\sin\theta}}$ is

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

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

C. $\sqrt{2(\tan x + \tan)\sec\theta} + C$

D. none of these

Answer: B

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13. If $\int \frac{e^{4x}-1}{e^2 x}\log\left(\frac{e^{2x}+1}{e^{2x}-1}\right)dx$ $\frac{t^2}{2}\log t - \frac{t^2}{4} + \frac{u^2}{4} + C$ them

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

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

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

D. none of these

Answer: C

View Text Solution

14. IF the primitive of $\sin^{-3/2} x \sin^{-1/2}(x+\theta)$ is - 2 cosec $\theta\sqrt{f(x)} + C$ then

A. $f(x) = \frac{\sin x}{\sin(x+\theta)}$

B. $f(x) = \tan(x+\theta)$

C. $f(x) = \left(\frac{\sin(x+\theta)}{\sin x}\right)$

D. $f(x) = \dfrac{\tan(x+\theta)}{\tan x}$

Answer: C

View Text Solution

15. If the primitive of $\dfrac{\sin x}{\sqrt{1+\sin x}}dx$ is $-1\sqrt{f(x)} + \sqrt{2}\log|\tan g(x)| + C$ then.

A. f(x) = 1 + sin x

B. $g(x) = (3\pi/8) - (x/4)$

C. f(x) = 2 (1 - sin x)

D. none of these

Answer: B

View Text Solution

16. if $\int \frac{(x^2-1)dx}{(x^4+3x^2+1)\tan^{-1}\frac{x^2+1}{x}} = \log|\tan^{-1} f(x)| + C$ then

A. $f(x) = x^2 + 1$

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

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

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

Answer: D

View Text Solution

17. If f(x) = $\lim_{n\to\infty} \frac{x^n - x^{-n}}{x^n + x^{-n}}, 0 < x < 1, n \in N$ then $\int (\sin^{-1} x) f(x) dx$ is equal to

A. $-\left[\sin^{-1} x + \sqrt{1+x^2}\right] + C$

B. $x\sin^{-1} x + \sqrt{1-x^2} + C$

C. constant

D. none of these

Answer: A

View Text Solution

18. If f(x) = $\lim_{n \to \infty} \left[2x + 4x^3 + \ldots + 2nx^{2n-1}\right]$ $(0 < x < 1)$ then $\int f(x)$ dx is equal to

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

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

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

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

Answer: D

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19. If f(x) = $\lim_{n \to \infty} e^{x \tan(1/n) \log(l/n)}$, and $\int \frac{f(x)}{3\sqrt{\sin^{11} x \cos x}} dx = g(x) + C$ (C being the constant of intergrtion), then.

A. $g(\pi/4) = 3/2$

B. g(x) is continuous for all $x \in R$

C. $g(\pi/4) = -15/8$

D. $g(\pi/4) = 1/2$

Answer: C

View Text Solution

20. If f(x) = $\lim_{n \to \infty} n^2 \left(x^{1/n} - x^{1/(n+1)}\right), x > 0$ then $\int x f(x)$ dx is equal to

A. $x^2/2$

B. 0

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

D. none of these

Answer: D

View Text Solution

21. Let f(x) = $\int e^x(x-1)(x-2)dx$. Then f decreases in the interval

A. $(-\infty, -2)$

B. $(-2, -1)$

C. (1,2)

D. $(2, \infty)$

Answer: C

View Text Solution

22. If $\int \frac{\sqrt{1+3\sqrt{x}}}{x^{2/3}}dx = 2f(x)^{3/2+C}$ then f(x) is equa to

A. $1 + x^{2/3}$

B. $1 + x^{1/3}$

C. $1 - x^{1/3}$

D. $1 - x^{2/3}$

Answer: B

View Text Solution

23. Let F and g be two polynomials then $\int (f(x)g''(x) - f''(x)g(x)dx$ is equal to (ignoring the constant of integration)

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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Solved Example Numerical Answer Type Question

1. If

$$\int \frac{x^2 - x^3}{x^3 - 2x^2 - x + 2} dx = A \log \left(c \left| \frac{(x+1)}{(x-2)^4} \right| \right)$$ then A is equal to.

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2. If $\int \frac{x^2 - 1}{(x^2+1)\sqrt{x^4+1}} dx$ is equal to $A \tan^{-1} \left(\frac{1}{\sqrt{2}} \sqrt{x^2 + 1/x^2} \right) + C$ then A is equal to

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3. If the graph of the antiderivative F(x) of $f(x) = \log(\log x) + (\log x) - 2$ passes through (e,7-e) then the term independent of x in F(x) is

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4. If

$$\int \frac{\cos^2 x + \sin 2x}{(2\cos x - \sin x)} dx = \frac{-A}{25}x - \frac{2}{5}\log|2\cos x - \sin x| + \frac{1}{2 - \tan x} + C$$

then A is equal to

View Text Solution

5. If $\int \frac{2e^{5x} + e^{4x} - 4e^{3x} + 2e^{x}}{(e^{2x} + 4)(e^{2x} - 1)^2} dx = \tan^{-1}\left(e^{x/2}\right) - \frac{K}{(e^{2x-1})} + C$ then K is equal to

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6. If $\int \frac{x^3}{4 + x^{16}} dx = \frac{A}{8}\frac{\tan^{-1}(z)}{\sqrt{2}} - \frac{1}{64}\log\left|\frac{u - \sqrt{2}}{u + \sqrt{2}}\right| + C$, where u = y + 1/y and z = y - 1/y = $x^4/\sqrt{2}$ then A is equal to.

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7. If

$$\int \frac{\cos^2 x \sin x}{\sin x - \cos x} dx = A \log|\sin x - \cos x| + \frac{1}{8}(\sin 2x + \cos 2x) + C$$

then A is equal to.

View Text Solution

8. If I = $\int \frac{\sin x (\cos x)^{-5/2} dx}{\sqrt{\sin x + 3\cos x} + \sqrt{\sin x + 4\cos x}}$

$= \frac{A}{4}\left((\tan x + 4)^{5/2} - (\tan x + 3)^{3/2}\right)$

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

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9. If

$$\int \frac{\cos^3 x dz}{(\sin^4 + x + 3\sin^2 x + 1)\tan^{-1}(\sin x + \cos ecx)} = -A \log$$

$\left|\tan^{-1}(\sin x + \cos ecx)\right| + C$ then A is equal to.

View Text Solution

10. $I = \dfrac{x\cos x + 1}{\sqrt{2x^3 e^{\sin x} + x^2}}dx$

$\dfrac{4}{5}A\log\left|\dfrac{\sqrt{2xe^{\sin x}+1}-1}{\sqrt{2xe^{\sin x}+1}+1}\right| + C$ then A is equal to.

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11.

$$I = \int \frac{dx}{2x\sqrt{1-x}\sqrt{2-x+\sqrt{1-x}}} = -\frac{1}{2\sqrt{3}}\log\left|u + \frac{1}{2} + \sqrt{u^2+u+\frac{1}{3}}\right.$$

where u = $\dfrac{1}{\sqrt{1-x}-1}$,

$v = \dfrac{1}{\sqrt{1-x}+1}$ then K is equal to

View Text Solution

12. If I =

$$\int \frac{dx}{1+\sqrt{x^2+2x+2}} = \frac{5}{8}A\log\left|x+1+\sqrt{x^2+2x+2}\right| - \frac{\sqrt{x^2+2x+2}}{x+1}$$

then A is equal to.

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13. If $\int \frac{\sqrt{1+3\sqrt{x}}}{3\sqrt{x^2}}dx = 2f(x) + C,$ then f(27) is equal to

View Text Solution

14. If I = $\int \frac{\sqrt{\cot x} - \sqrt{\tan x}}{1+3\sin 2x}dx = A\tan^{-1}\left(\frac{\sqrt{\tan x} + \sqrt{\cot x}}{B}\right) + C,$

then |A/B| is equal to

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15. If

$$\int \frac{\cos^2 x \sin x}{\sin x - \cos x}dx = A\log|\sin x - \cos x| + \frac{1}{8}(\sin 2x + \cos 2x) + C,$$

then A is equal to

View Text Solution

16. If

$$I = \int \frac{\cos^3 x dx}{\left(\sin^4 x + 3\sin^2 x + 1\right)\tan^{-1}(\sin x + \cos ecx)} = A\log\left|\tan^{-1}(\sin x +\right.$$

then |A| is equal to

View Text Solution

Exercise Concept Based Single Correct Answer Type Questions

1. If $\int (1 - \tan 3x)^2 dx = \frac{1}{3}[\tan 3x + \log f(x)] + C$ then f(x) is given by

A. cos 3x

B. $\cos^2 3x$

C. $\sin^2 3x$

D. $\cos^3 3x$

Answer: B

View Text Solution

2. $\int \frac{dx}{x^4 - x^2} = \frac{1}{x} + \log|f(x)| + C$ then f(x) is given by

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

B. $\frac{x-1}{x+1}$

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

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

Answer: C

View Text Solution

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

A. $\frac{1}{4}x\log|x| - \frac{3}{16}\log|2x-1| - \frac{9}{16}\log|2x+1| + C$

B. $\frac{1}{4}x - \log|x| - \frac{5}{16}|2x-1| - \frac{7}{16}\log|2x+1| + C$

C. $\frac{1}{4}x - \log|x| - \frac{7}{16}|2x-1| - \frac{9}{16}\log|2x+1| + C$

D. $\frac{1}{4}x + \log|x| - \frac{7}{16}\log|2x-1| - \frac{9}{16}\log|2x+1| + C$

Answer: D

View Text Solution

4. $\int x^5 3\sqrt{\left(1+x^3\right)^2}dx$ is equal to

A. $\frac{1}{8}u^{8/3}-\frac{1}{5}u^{5/3}+C, u=1+x^3$

B. $\frac{3}{8}u^{8/3}-\frac{5}{3}u^{5/3}+C, u=1+x^3$

C. $-\frac{3}{8}u^{8/3}+\frac{3}{5}u^{5/3}+C, u=1+x^3$

D. $-\frac{1}{8}u^{8/3}+\frac{1}{5}u^{5/3}+C, u=1+x^3$

Answer: A

View Text Solution

5. $\int \frac{dx}{\sin^5 x \cos^5 x}$ is equal to

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

B. $\frac{1}{4}\left(\tan^4 x - \cot^4 x\right) + 2\left(\tan^2 x - \cot^2 x\right) + 6\log|\tan x|$

C. $\frac{1}{4}\left(\tan^4 x - \cot^4 x\right) + 2\left(\cot^2 x - \tan^2 x\right) + 6\log|\cot x| + C$

D. $\frac{1}{4}\left(\cot^4 x - \tan^4 x\right) + 2\left(\cot^2 x - \tan^2 x\right) + 6\log|\tan|x| + C$

Answer: B

View Text Solution

6. If $\int \frac{dx}{5 - 4\sin x + 3\cos x}$ is equal to $\frac{1}{2 + f(x)} + C$ then f(x) is equal to

A. tan x

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

C. $-\frac{\tan(x)}{2}$

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

Answer: C

View Text Solution

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

A. $\log(1+e^x)$

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

C. $2\log(1+e^x)$

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

Answer: B

View Text Solution

8. If $\int e^x \cos 4x dx = Ae^{5x}\left(\sin 4x + \frac{5}{4}\cos 4x\right) + C$ then A is equal to

A. $\frac{4}{41}$

B. $\frac{3}{41}$

C. $\frac{5}{41}$

D. $\frac{9}{41}$

Answer: A

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9. The integral of f(x) $= 3^x \cos x$ is given by

A. $3^x(\sin x + \cos x \log 3) + C$

B. $3^x(\log 3 \sin x + \cos x) + C$

C. $3^x \dfrac{(\sin x + \cos \log 3)}{\left(1 + (\log 3)^2\right)}$

D.

Answer: C

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10. If $\int \dfrac{dx}{\sin 2x - 2x \sin x} = C - \dfrac{1}{4}\log|f(x)| + \dfrac{1}{8\frac{\sin^2(x)}{2}}$ then f(x) is equal to

A. $\tan^2 x$

B. $2\frac{\tan(x)}{2}$

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

D. $\frac{\sin(x)}{2}$

Answer: C

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Exercise Level 1 Single Correct Answer Type Question

1. If $f_n = \log\log\ldots\log x$ (log is repeated n times) then $\int [x f_1(x) f_2(x) \ldots f_n(x)]^{-1} dx$ is equal to

A. $f_{n+1}(x) + C$

B. $\frac{f_{n+1}(x)}{n+1} + C$

C. $n f_n(x) + C$

D. none of these

Answer: A

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

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

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

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

D. none of these

Answer: C

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3. The value of $\int \log(1 - \sqrt{x})$ dx is

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

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

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

D. none of these

Answer: B

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4. $\int\frac{x+1}{x(1+xe^x)}dx$

A. $\log|1+xe^x|+x+C$

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

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

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

Answer: C

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5. If $\int(\sin 2x - \cos 2x)dx = \frac{1}{\sqrt{2}}\sin(2x - a) + C$, then a=

A. $K = \pi/4$

B. $K = 5\pi/4$

C. f(x) = 1 + cos x

D. none of these

Answer: B

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6. $\int \frac{x + \sin x}{1 - \cos x}dx =$

A. $f(x) = x^2$

B. f(x)= x

C. f(X) = sin x

D. none of these

Answer: B

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

A. $f(x) = x^2$

B. f(x) = cos x

C. f(x) = sin x

D. $f(x) = \tan^2 x$

Answer: D

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8. The function f whose graph passes through $(\pi/4, 0)$ and whose derivative is $\frac{\log(\tan x)}{\sin x \cos x}$ is given by

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

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

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

D. $\frac{1}{2}(\log \tan x)^2$

Answer: D

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9. The function f whose graph passes through (4, - 20) and whose derivative is $\cos\left(\sqrt{4-x}\right)$ is given by

A. $\sqrt{4-x}\sin\sqrt{4-x} + (4-6x)\cos\sqrt{4-x}$

B. $\sqrt{4-x}\sin\sqrt{4-x} + \sqrt{4-x}\cos\sqrt{4-x} - 20$

C. $-2\left(\sqrt{4-x}\sin\sqrt{4-x} + \cos\sqrt{4-x}\right) - 18$

D. $-(2x+12)\sqrt{4-x}\sin\sqrt{4-x} + (4-6x)\cos\sqrt{4-x}$

Answer: D

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10. If it is know that at the point x = 1 two anti- derivatives of $f(x) = e^x$ differ by 2, the difference of the anti - derivatives at x = 100 is :

A. e^{100}

B. 100

C. 2

D. none of these

Answer: C

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11. If $\int \frac{dx}{\cos^6 x + \sin^6 x} = \tan^{-1}(-K\cot 2x) + C$ then

A. K=2

B. k=4

C. k=6

D. k depends on x

Answer: A

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12. If $\int \frac{\sin^2 x}{1+\sin^2 x} dx = x - K \tan^{-1}(M \tan x) + C$ then

A. $M = \frac{1}{\sqrt{2}}$

B. $K = \frac{1}{\sqrt{2}}$

C. $M = -\frac{1}{\sqrt{2}}$

D. $K = -\frac{1}{\sqrt{2}}$

Answer: B

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13. $\int \tan^4 x dx = A\tan^3 x + B\tan x + f(x)$, then

A. K = 2/3

B. L = -2

C. f(x) = x + c

D. K = 4//3

Answer: C

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14. If $\int \log\left(\sqrt{1-x} + \sqrt{1+x}\right) dx = xf(x) + Ax + B\sin^{-1} x + C$, then

A. $f(x) = \log\left(\sqrt{1-x} + \sqrt{1+x}\right)$

B. L = - 1/3

C. M = -2/3

D. M = - 1/2.

Answer: A

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15. $If \int x \log\left(1+\frac{1}{x}\right)dx = f(x)\log(x+1) + g(x)x^2 + dx + C, then$

A. $f(x) = (1/2)x^2$

B. g(x) = log x

C. L = 1

D. none of these

Answer: D

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16. If $\int \frac{1}{(x^2+1)(x^2+4)}dx = A\tan^{-1}x + B\ \tan^{-1}\frac{x}{2} + C$, then

A. K = 2/3

B. L = 2/3

C. K = -2/3

D. L = -1/6.

Answer: D

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17. If $\int \frac{\cos^4 x}{\sin^4 x} dx = K \cot x + M \sin 2x + L\frac{x}{2} + C$ then

A. L = 1

B. K = - 2

C. M = -14

D. none of these

Answer: A

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18. If $\int \frac{xe^x}{\sqrt{1+e^x}}dx = f(x)\sqrt{1+e^x} - 2\log g(x) + C$, then

A. $g(x) = \frac{\sqrt{1+e^x}+1}{\sqrt{1+e^x}-1}$

B. $g(x) = \frac{\sqrt{1+e^x}-1}{\sqrt{1+e^x}+1}$

C. f(x) = x-1

D. f(x) = 3 (x-2)

Answer: B

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19. The value of the integral $\int \frac{\log(x+1) - \log x}{x(x+1)}dx$ is

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

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

C. $C - (1/2)[\log(1+1/x)]$

D. none of these

Answer: A

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20. If $\int$ cosec 2x dx = f|g(x)| + C then

A. range of g (x) = $[0, \infty)$

B. dom f = $(0, \infty)$

C. g' (x) = - $\cos ec^2 x$

D. f' (x) = 1/x for all $x \in (0, \infty)$

Answer: B

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21. If $\int f(x)dx = 2\cos\sqrt{x} + c$, then f(x) =

A. $\sin\sqrt{x}$

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

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

D. none of these

Answer: B

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22. $\int \frac{dx}{2\sin x - \cos x + 3} =$

A. $A = 1/\sqrt{5}$

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

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

D. none of these

Answer: A

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23. The antiderivative of $\frac{1}{\sin^2 x + \tan^2 x}$ is

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

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

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

D. none of these

Answer: B

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24. If the antiderivative of $\frac{1}{\sqrt{x + x^{3/2}}}$ is $A\sqrt{1+\sqrt{x}} + C$ then A is equal to

A. 2

B. 1

C. 3

D. 4

Answer: D

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25. $\int \frac{e^{3x} + e^{x}}{e^{4x} - e^{2x} + 1} dx$

A. sin x

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

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

D. tan x

Answer: C

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26. The value of $\int e^{\sec x} \cdot \sec^3 x \left(\sin^2 x + \cos x + \sin x + \sin x \cos x\right) dx$ is

A. $e^{\sec x}(\sec x + \tan x) + C$

B. $e^{\sec x}\left(\sec^2 x + \sec x \tan x\right) + C$

C. $e^{\sec x}\left(\sec^2 x + \tan\right) + C$

D. none of these

Answer: A

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27. If $\int \frac{3\cos x + 2\sin x}{4\sin x + 5\cos x} dx = Ax + B\log|4\sin x + 5\cos x| + C$,then:

A. A = 23/41, B = 1/41

B. A = 23/41,B 2/41

C. A=11/23,B=2/23

D. A=12/23,B=2/23

Answer: B

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28. If $\int \frac{dx}{4-3\cos^2 x+5\sin^2 x} = \frac{1}{3} f(3\tan x) + C$ then f(x) is equal to

A. $3\tan^{-1} x$

B. x^2

C. x^2+1

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

Answer: D

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29. If f(x) = $\frac{X^2}{1+x^2}$ and g(x) = sin x then $\int fog(x)\cos x dx$ is

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

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

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

D. none of these

Answer: A

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30. If $P(x) = \int \frac{x^3}{x^3 - x^2} dx, Q(x) = \int \frac{1}{x^3 - x^2} dx$ and $(P + Q)(2) = \frac{5}{2}$, ther

A. 44318

B. $\frac{5}{4} + \frac{\log(4)}{3}$

C. $\frac{10}{3} + \frac{\log(4)}{3}$

D. none of these

Answer: D

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31. Evaluate the following Integrals :

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

A. $\sqrt{\frac{x^4 + x^2 + 1}{x}} + C$

B. $\frac{x^2}{\sqrt{x^4 + x^2 + 1}} + C$

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

D. $\frac{\sqrt{x^4 + x^2 + 1}}{x} + C$

Answer: D

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32. $\int \frac{1}{x}(\log_{ex} e)dx$ is equal to

A. $\log_e(1 - \log_e) + C$

B. $\log_e(\log_e ex - 1) + C$

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

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

Answer: D

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33. If $\int \frac{x+\left(\cos^{-1}3x\right)^2}{\sqrt{1-9x^2}}dx = A\sqrt{1-9x^2}+B\left(\cos^{-1}3x\right)^3+C,$ then A-B is

A. $C-\left(\frac{1}{9}\sqrt{1-9x^2}+\left(\cos^{-1}3x\right)^3\right)$

B. $C+\left(\frac{1}{9}\sqrt{1-9x^2}+\left(\cos^{-1}3x\right)^3\right)$

C. $C-\left(\sqrt{1-9x^2}+\left(\cos^{-1}3x\right)^3\right)$

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

Answer: A

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

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

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

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

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

Answer: B

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35. If $I=\int \sec^{-1}\sqrt{x}dx$, then I equals

A. $x\sec^{-1}\sqrt{x}-\log(1+x)+C$

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

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

D. $x\sec^{-1}\sqrt{x}+\log(1+x)+C$

Answer: C

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Exercise Level 2 Single Correct Answer Type Question

1. If $f(x) = \int (x^3 - 2x^2 + 3)e^{3x}$ dx then the number of critical points of f are

A. 1

B. 2

C. 3

D. 4

Answer: A

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2. If f(x) = $\int \frac{3x+2}{x^4-x^3+x^2-1}dx$ then f(x) has

A. one critical point

B. two critical points

C. three critical points

D. no critical points

Answer: C

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3. The function f(X) = $\int \frac{(x-2)dx}{x^2-7x+12}$

A. decreases on R

B. increases on R~$(2, 3)$

C. increases on $[2, 3) \cup (4, \infty)$

D. decreases on $(2, \infty)$

Answer: C

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4. If f(x) = sin x then $\int \frac{e^{f(x)}\left(x\cos^3 x - f(x)\right)}{1-(f(x))^2}dx$ is equal to

A. $e^{f(x)}(x-\sin x)+C$

B. $e^{f(x)}(x-\sec x)+C$

C. $e^{f(x)}(x+\sec x)+C$

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

Answer: B

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5. $\int \frac{4e^x+6e^{-x}}{9e^x-4e^{-x}}dx$

A. A=3/2,B=35/36

B. A=-5/4,B23/24

C. A=-3/2,B=35/36

D. A=5/4,B=-35/36

Answer: C

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6. Let f be a continuous function satisfying f(x + y) = f (x) f(y) $(x, y \in R)$ with f(1) = e then the value of $\int \frac{xf(x)}{\sqrt{1+f(x)}}dx$ is

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

B. $2\sqrt{1+e^x} - 4\sqrt{1+f(x)} - 2\log\left|\sqrt{1+f(x)}-1\right| + C$

C. $2\sqrt{1+f(x)} - 4\sqrt{1+f(x)} - 2\log\left|\frac{\sqrt{1+f(x)}-1}{\sqrt{1}+f(x)}\right| + C$

D. none of these

Answer: A

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7. $\int \frac{x^7}{x^4+1} dx$

A. $f(x) = 1 + x^4$

B. $f(x) = \frac{1}{(1+x^4)^2}$

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

D. $f(x) = \tan^{-1}(1+x^4)$

Answer: C

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8. The function f whose graph passes through (0,0) and whose derivative is $\frac{\cos^4 x + \sin^4 x}{\cos^2 x - \sin^2 x}$ is given by

A. $\frac{1}{4}\log\left|\frac{1+\tan x}{1-\tan x}\right| + \frac{1}{2}\sin x \cos x$

B. $\log\left|\frac{\cos x + \sin x}{\cos x - \sin x}\right| + \sin 2x$

C. $\log\left|\frac{\cos x - \sin x}{\cos x + \sin x}\right| + \frac{1}{2}\sin x \cos x + x$

D. none of these

Answer: A

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9. Let P(x) be a polynomial of degree n with leading coefficient 1. Let v (x) be any function and $v_1(x) = \int v(x)dx$,
$v_2(x) = \int v_1(x)dx \ldots v_{n+1} = \int v_n(x)dx.$
then $\int P(x)v(x)dx$ is equal to

A.

$$P(x)v_1(x) + \frac{p'(x)v_2(x)}{2!} + \frac{P''(x)v_3(x)}{3!} \ldots + (v_{n+1}(x))((n+1)!)$$

/

B. $P(x)v_1(x) - P(x)v_2(x) + P''(x)v_3(x) \ldots + (-1)^n n! v_{n+1}(x)$

C. $P(x)v_1(x) + P'(x)v_2 + P''(x)v_3(x) \ldots + nv_n + 1(x)$

D. $P(x)v_1(x) - \frac{p'(x)v_2(x)}{2!} + \frac{P''(x)v_3(x)}{3!} \ldots + (-1)^n \frac{v_{n+1}(x)}{(n+1)}!$

Answer: B

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10. If $\int \frac{x+1}{(x^2+x+1)} \frac{dx}{\sqrt{x^2+x+1}} = K \frac{x-1}{\sqrt{x^2+x+1}} + C$ then the value of K is

A. 1//3

B. 1//3

C. 2//3

D. none of these

Answer: C

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11. Let f be a continuous function satisfying f (x+y) = f (x) + f (y), for each $x, y \in R$ and f(1) = 2 then $\int \frac{f(x)\tan^{-1} x}{(1+x^2)^2} dx$ is equal to

A. cannot be determined explicity

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

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

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

Answer: D

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12. The value of $\int\frac{dx}{4\sqrt{(x-1)^3(x+2^2)}}$ is

A. $3(x-1)^{1/4}-(5/3)(x+2)^5+C$

B. $4\left(4\sqrt{x-1}\right)-5\left(4\sqrt{(x+2)^5}\right)+C$

C. $\frac{4}{3}\sqrt{\frac{x-1}{x+2}}+C$

D. none of these

Answer: C

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13. $\int \frac{\cos 4x - 1}{\cot x - \tan x} dx$ 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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14. If $f(x) = \lim_{n \to \infty} \frac{x^n - x^{-n}}{x^n + x^{-n}}, x > 1$ then $\int \frac{x f(x) \log\left(x + \sqrt{1 + x^2}\right)}{\sqrt{1 + x^2}} dx$ is

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

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

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

D. none of these

Answer: D

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15. The value of $\int \sin 3\sqrt{x}\, dx$ is

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

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

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

D. none of these

Answer: B

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16. Let f(x) be a function satisfying f'(x) = f(x) and f(0) = 2. Then $\int \frac{f(x)}{3+4f(x)}dx$ is equal to

A. $(1/4)\log(3+8e^x)+C$

B. $(1/2)\log(3+5e^x)+C$

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

D. none of these

Answer: A

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17. If $\int \frac{f(x)}{x^2-x+1}dx = \frac{3}{2}\log\left(x^2-x+1\right)+\frac{1}{\sqrt{3}}\frac{\tan^{-1}(2x-1)}{\sqrt{3}}+C$ then f(x) is equal to

A. 3x

B. 3x-4

C. 3x-1

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

Answer: C

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18. If the antiderivative of $\frac{1}{x^2\sqrt{1+x^2}}$ is $-\frac{\sqrt{f(x)}}{x}+C$ then f(x) is equal to

A. $1+1/x^2$

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

C. $1+x^2$

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

Answer: C

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19. $\int \frac{dx}{\cos^3 x}\sqrt{\sin 2x}$

A. a rational function of tan x

B. an irrational function tan x

C. a rational function of cos x

D. a rational function of sin x

Answer: B

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20. If $f(x) = \sqrt{x}, g(x) = e^x - 1$ and $h(x) = \tan^{-1} x$ then the antiderivative of f o g (x) is

A. 2[g o f (x) - g o f o h (x)] + C

B. 2 [f o g (x) - f o g o h (x)] + C

C. f o g (x) + f o g o h (x) + C

D. 2 [f o g (x) - h o f o h (x)] + C

Answer: D

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21. If $f(x) = \sqrt{4x^2 + 4x - 3}$ then $\int \frac{x+3}{f(x)} dx$ is equal

A. (1/4) f(x) + (2/3) log | 2x + 1+ f(x)| + C

B. (1/4) f(x) + (5/4) log |2x + 1 + f(x)| + C

C. (1/3) f(x) + (2/3) log |(x+3)| + C

D. (2/3) f(x) + (1/3) log |(x+3) + f(x)|

Answer: B

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22. If f (x) = $\frac{1+\sqrt{2}\cos x}{1-\sqrt{2}\cos x}$ and $g(x) = \tan\frac{x}{2}$ and $h(x) = \log|x|$ then $\int \frac{dx}{\sin x(2\cos^2 x -$

is equal to

A. $\left(1/\sqrt{2}\right)\log|f(x)| + goh(x) + C$

B. $\sqrt{2}$ h o f (x) + h o g (x) + C

C. h o (f + g) (x) + C

D. $\left(1/\sqrt{2}\right)$ f o (g + h) (x) + C`

Answer: B

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23. If $f(x) = \sqrt{x^2+4}$ then $\int \frac{f(x)}{x^6}dx$ is equal to

A. $\frac{(f(x))^3\left((f(x))^2 - 10\right)}{120x^5} + C$

B. $\frac{(f(x))^3\left((f(x))^2 - 4\right)}{6x^5} + C$

C. $\frac{(f(x))^3\left((f(x))^2 - 2\right)}{20x^5} + C$

D. $\frac{(f(x))^3\left(x^2 - 6\right)}{6x^5} + C$

Answer: A

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24. If f(x) = cos x an g (x) = sin x then $\int a \frac{\log f(x)}{(f(x))^2} dx$

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

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

C. $\frac{f(x)}{g(x)}(\log g(x)+1)+X+C$

D. $\frac{g(x)}{f(x)}[(\log f(x)+1]-x+C$

Answer: D

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25. If f (x) = cos x then $\int\left(2(f(x))^2-1\right)\left(4(f(x))^3-3f(x)\right)$ dx is equal to

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26. If

$I_n = \int \cot^n dc$ and $I_0 + I_1 + 2(I_2 + \ldots\ldots + I_8) + I_9 + I_{10} = A\left(u + \frac{u^2}{2}\right.$

constant where $u = \cot x$ then

A. A=1

B. A=-1

C. A=1/2

D. A=-1/2

Answer: B

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27. f(x) = $\int \frac{dx}{\sin^4 x}$ is a

A. polynomial of degree 3 in cot x

B. polynomial of degree 4 in cot x polynomial of degree 4 in sin x

C. polynomial of degree 3 in tan x

D.

Answer: A

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28. If $f(x) = \sqrt{x^2 - a^2}$ then $\int \frac{x^2}{f(x)} dx$ is

A. $x f(x) + \frac{a^2}{2} \log|x + f(x)| + C$

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

C. $\frac{x^2}{2} f(x) + a^2 \log \mid x - f(x) + C$

D. $\frac{x}{2} f(x) + \frac{a^2}{2} \log|x + f(x)| + C$

Answer: D

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29. Let $f(x) = \dfrac{x}{(1+x^n)^{\frac{1}{n}}}$ for $n \geq 2$ and $g(x) = (f(ofo...of)(x)$ Then $\int x^{n-2} g(x) dx$ equals

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

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

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

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

Answer: A

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30. If $\int f(x)dx = \phi(x) i.e.\ \phi$ is a function such that $\phi'(x) = f(x)$, then $\int x^9 f(x^5) dx$ is equal to

A. $\dfrac{1}{5}\left[x^5\phi(x^5) - \int x^4\phi(x^5)dx\right] + C$

B. $\dfrac{1}{5}x^5\phi(x^5) - 5\int x^5\phi(x^5)dx + C$

C. $\dfrac{1}{5}x^5\phi(x^5) - \int x^4\phi(x^5)dx + C$

D. $\frac{1}{5}\left[x^5\phi\left(x^5\right) - \int x^5\phi\left(x^5\right)dx\right] + C$

Answer: C

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Exercise Numerical Answer Type Question

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

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2. If F(x) = $\int \frac{\left(x^2+1\right)dx}{3\sqrt{x^3+3x+6}}$ and $F(1) = \left(\frac{25}{2}\right)^{\frac{1}{3}}$ then the value of F(-2) is

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3. If $\int \frac{2\cos x - \sin x - 1}{\cos x + \sin x - 2} dx = B\log|f(x)| + Dx + C$ then |f(0)| + B + 2D is equal to

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4. If

$$I = \int x \sin^{-1}\left\{\frac{1}{2}\sqrt{\frac{2a-x}{a}}\right. dx = Kx^2 \sin^{-1}\left\{\frac{1}{2}\sqrt{\frac{2-x}{a}}\right\} + \frac{1}{2a}\left\{t^{\frac{5}{2}} + 4a\right.$$

, then K is equal to

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5. If

$$\int\left(x^{\frac{1}{3}} + (\tan x)^{\frac{1}{3}}\right)dx = \frac{3}{4}x^{\frac{4}{3}} - \lambda\log\left(l + t^2\right) + \frac{1}{\sqrt{3}}\frac{\tan^{-1}\left(2t^2 - 1\right)}{\sqrt{3}} + C,$$

then λ is equal to

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6. If $\int \frac{x+1}{(x^2+x+1)\sqrt{x^2+x+1}}dx = \frac{\lambda}{3}\frac{x-1}{\sqrt{x^2+x+1}} + C$ then λ is equal to

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7. If $I = \int (2\cos^2 x - 1)(4\cos^3 x - 3\cos x)dx = A\sin 5x + \frac{1}{2}\sin x + C$ then A is equal to

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8. Let F(x) be the antidericative of f(x) = 3 cos x - 2 sin x whose graph passes through the point $(\pi/2, 1)$ Then $F(\pi/4)$ is equal to $(\sqrt{2} = 1.41)$

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9. Let F(x) be the antiderivative of f(x) = 1/(3+5 sin x + 3cos x) whose graph passes through the point (0,0). Then $\frac{F(\pi/2)}{\log 8/3}$ is equal to

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10. A function $y = f(x)$ satisfying $f'(x) = x^{-\frac{3}{2}}, f'(4) = 2$ and $f(0) = 0$ is

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11. If $\int \frac{dx}{e^{2x} + e^{-2x}} = \frac{A}{842} \tan^{-1} e^{2x} + C$ then A equals ...

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12. 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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13. If $\int \frac{f(x)}{1-x^3}dx = \log\left|\frac{x^2+x+1}{x-1}\right| + \frac{A}{\sqrt{3}}\frac{\tan^{-1}(2x+1)}{\sqrt{3}} + C$ then A is equal to , where f(x) is a polynomial of second degree in x suh that f(0) = $f(1) = 3f(2) = 3.\ (\sqrt{3} = 1.73)$

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

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15. If $\int \frac{\cos^7 x + \cos^5 x}{\sin^2 x + \sin^4 x} = -A\sin^3 x + 5\sin x - \frac{2}{\sin x} - 12\tan^{-1} + C$ then A is equal to

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Question From Previous Years Aieee Jee Main Papers

1. If $\int \frac{\sin x}{\sin(x-\alpha)} dx = Ax + B\log\sin(x-\alpha) + C$, then the value of (A,B) , is

A. $(-\sin\alpha, \cos\alpha)$

B. $(\cos\alpha, \sin\alpha)$

C. $(\sin\alpha, \sin\alpha)$

D. $(-\cos\alpha, \sin\alpha)$

Answer: B

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

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

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

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

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

Answer: D

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

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

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

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

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

Answer: B

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4. $\int \frac{dx}{\cos x + \sqrt{3}\sin x}$ equals: (1) $\frac{1}{2}\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$ (2) $\frac{1}{2}\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)+c$ (3) $\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$ (4) $\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)+c$

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

Answer: A

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5. The value of $\sqrt{2}\int \frac{\sin x dx}{\sin\left(x-\frac{\pi}{4}\right)}$

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

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

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

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

Answer: C

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6. If the integral $\int \frac{5\tan x}{\tan x - 2} dx = x + a\ln|\sin x - 2\cos x| + k$, then a is equal to:

A. -2

B. 1

C. 2

D. -1

Answer: C

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7. If $\int\left(\frac{x^2-x+1}{x^2+1}\right)e^{\cot^{-1}x}dx = A(x)e^{\cot^{-1}x}+c,\ A =$

A. $-x$

B. x

C. $\sqrt{1-x}$

D. $\sqrt{1+x}$

Answer: B

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8. The integral $\int\frac{x}{2-x^2+\sqrt{2-x^2}}dx$ equals

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

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

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

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

Answer: B

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9. $\int \frac{dx}{x+x^7} = p(x)$, then $\int \frac{x^6}{x+x^7} dx$ is

A. log |x| - p(x) + C

B. log |x| + p(x) + C

C. x - P(x) + C

D. x + p(x) + C

Answer: A

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10. If $\int f(x)dx = \psi(x)$, then $\int x^5 f\left(x^3\right) dx$

A. $\frac{1}{3}x^3\Psi(x)^3 - 3\int x^3\Psi\left(x^3\right)dx + C$

B. $\frac{1}{3}x^3\Psi(x^3) - \int x^2\Psi(x^3)dx + C$

C. $\frac{1}{3}[x^3\Psi(x^3) - [x^3\Psi(x^3)dx] + C$

D. $\frac{1}{3}\left[x^3\Psi(x^3) - \int x^2\Psi(x^3)dx\right] + C$

Answer: B

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11. The integral $\int\left(1 + x - \frac{1}{x}\right)e^{x+\frac{1}{x}}dx$ is equal to

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

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

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

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

Answer: B

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12. $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx =$

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

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

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

D. $-\sin^2 x + C$

Answer: B

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13. The integral $\int x \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) dx (x > 0)$ is equal to

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

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

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

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

Answer: A

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14. $\int\left(\frac{\sin^2 x \cos^2 x}{\sin^3 x + \cos^3 x}\right)dx=$

A. $\frac{1}{1+\cot^3 x}+C$

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

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

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

Answer: B

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15. If m is a non-zero number and $\int\frac{x^{5m-1}+2x^{4m-1}}{\left(x^{2m}+x^m+1\right)^3}dx = f(x)+c,$

then f(x) is:

A. $\frac{x^{5m}}{2m(x^{2m}+x^m+1)}$

B. $\frac{2m\left(x^{5m}+x^{4m}\right)}{\left(x^{2m+}x^m+1\right)^2}$

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

D. $\frac{x^{5m}+x^{4m}}{2m(x^{2m}+x^m+1)^2}$

Answer: B

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16. The integral $\int \frac{dx}{x^2(x^4+1)^{3/4}}$ equal

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

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

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

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

Answer: D

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17. The integral $I = \int \frac{dx}{(x+1)^{3/4}(x-2)^{5/4}}$ is equal to

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

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

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

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

Answer: C

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18. if $I = \int \frac{\log\left(t+\sqrt{1+t^2}\right)}{\sqrt{1+t^2}}dt = \frac{1}{2}(g(t))^2 + c$ then $g(2)$ is (A) $2\log\left(2+\sqrt{5}\right)$ (B) $\log\left(2+\sqrt{5}\right)$ (C) $\frac{1}{\sqrt{5}}\log\left(2+\sqrt{5}\right)$ (D) $\frac{1}{2}\log\left(2+\sqrt{5}\right)$

A. $2\log\left(2+\sqrt{5}\right)$

B. $\log\left(2+\sqrt{5}\right)$

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

D. $\frac{1}{2}\log\left(2+\sqrt{5}\right)$

Answer: B

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19. The integral $\int \frac{2x^{12}+5x^9}{\left(x^5+x^3+1\right)^3}dx$ is equal to (where C is a constant of integration)

A. $\frac{-5^x}{\left(x^5+x^3+1\right)^2}+C$

B. $\frac{x^{10}}{2(x^5+x^3+1)}+C$

C. $\frac{x^5}{2\left(x^5+x^3+1\right)^2}+C$

D. $\frac{-x^{10}}{2\left(x^5+x^3+1\right)^2}+C$

Answer: B

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20. The integral $\int \frac{1}{(1+\sqrt{x})\sqrt{x-x^2}}dx$ is equal to (where C is the constant of integration)

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

B. $-\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}+C$

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

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

Answer: C

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21. If $\int \frac{1}{\cos^2 x\sqrt{2\sin 2x}}dx = (\tan x)^A + C(\tan x)^B + k$, where k is a constant of integration , the A+B+C equals

A. $\frac{16}{5}$

B. $\frac{27}{10}$

C. $\frac{7}{10}$

D. $\frac{21}{5}$

Answer: A

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

A. $4\log\left(\sin\frac{x}{2}\right)+C$

B. $2\log\left(\sin\frac{x}{2}\right)+C$

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

D. $4\log\left(\cos\frac{x}{2}\right)+C$

Answer: B

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23.

$If f\left(\frac{3x-4}{3x+4}\right) = x+2, x \neq \frac{4}{3}$, and $\int f(x)dx = A\log|1-x| + Bx + C$

then ordered pair of (A,B)

A. $f\left(\frac{3x-4}{3x+4}\right) = x+2, x \neq \frac{-4}{3}$ and $\int f(x)dx = A\log|l-x| + Bc +$

B. $\left(\frac{-8}{3}, \frac{2}{3}\right)$

C. $\left(\frac{-8}{3}, \frac{-2}{3}\right)$

D. $\left(\frac{8}{3}, \frac{-2}{3}\right)$

Answer: B

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24. Let $I_n = \int \tan^n x dx, (n > 1)$. If $I_4 + I_6 = a\tan^5 x + bx^5 + C$, Where C is a constant of integration, then the ordered pair (a, b) is equal to :

A. $\left(\frac{-1}{5}, 0\right)$

B. $\left(\frac{-1}{5}, 1\right)$

C. $\left(\frac{1}{5}, 0\right)$

D. $\left(\frac{1}{5}, 1\right)$

Answer: C

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25. If $\int \frac{2x+5}{\sqrt{7-6x-x^2}} dx = A\sqrt{7-6x-x^2} + B\sin^{-1}\left(\frac{x+3}{4}\right) + C$ (Where C is a constant of integration), then the ordered pair (A, B) is equal to :

A. (-2,-1)

B. (2,-1)

C. (-2,1)

D. (2,1)

Answer: A

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26. if $f\left(\frac{x-4}{x+2}\right) = 2x + 1, (x \in R - \{1, -2\})$, then $\int f(x)dx$ is equal to : (where C is constant of integration)

A. $12\log|1-x| - 3x + C$

B. $-12\log|1-x| - 3x + c$

C. $= 12\log|1-x| + 3x + C$

D. $12\log|1-x| + 3x + C$

Answer: B

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27. $\int \frac{\sin^2 x \cos^2 x}{\left(\sin^5 x + \cos^3 x \sin^2 x + \sin^3 x \cos^2 x + \cos^5 x\right)^2} dx$

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

B. $\frac{1}{1+\cot^3}+C$

C. $\frac{-1}{1+\cot^3 x}+C$

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

Answer: A

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28. If $\int \frac{x+1}{\sqrt{2x-1}}dx = f(x)\sqrt{2x-1}+C$, where C is a constant of integration, then f(x) is equal to

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

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

C. $\frac{2}{3}(x-4)$

D. $\frac{1}{3}(x+4)$

Answer: D

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29. $\int \frac{3x^{13}+2x^{11}}{(2x^4+3x^2+1)^4}dx$

A. $\frac{x^4}{6(2x^4+3x^2+1)}+C$

B. $\frac{x^{12}}{6(2x^4+3x^2+1)}+C$

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

D. $\frac{x^{12}}{(2x^4+3x^2+1)}+C$

Answer: B

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30. If $\int \frac{\sqrt{1-x^2}}{x^4}dx = A(x)\left(\sqrt{1-x^2}\right)^m + C$,for a suitable chosen integer m and a function A(x), where C is a constant of integration, then $(A(x))^m$ equals

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

B. $-\frac{1}{27x^9}$

C. $\frac{1}{9x^4}$

D. $\frac{1}{27x^6}$

Answer: B

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31. If $\int x^5 e^{-x^2} dx = g(x)e^{-x^2} + C$, where C is a constant of integration, then g(-1) is equal to

A. $4x^3 - 1$

B. $4x^3 + 1$

C. $-2x^3 - 1$

D. $-2x^3 + 1$

Answer: A

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32. Let $n \geq 2$ be a natural number and $0 < \theta < \frac{\pi}{2}$, Then, $\int \frac{(\sin^n \theta - \sin\theta)^{\frac{1}{n}} \cos\theta}{\sin^{n+1}\theta} d\theta$ is equal to (where C is a constant of integration)

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

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

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

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

Answer: C

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33. If $f(x) = \int \frac{5x^8 + 7x^6}{(x^2 + 1 + 2x^7)^2} dx$, $(x \geq 0)$, and f(0) = 0, then the value of f(1) is

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

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

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

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

Answer: D

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34. For $x^2 \neq n\pi + 1, n \in N$ (the set of natural numbers), the integral $\int x \sqrt{\frac{2\sin(x^2-1) - \sin 2(x^2-1)}{2\sin(x^2-1) + \sin 2(x^2-1)}} dx$ is

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

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

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

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

Answer: A

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35. $\int \cos(\log x)dx$

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

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

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

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

Answer: B

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Questions From Previous Years B Architecture Entrance Examination Papers

1. An antiderivative of the integral $\int e^x \left(\frac{1-x}{1+x}\right)^2 dx$ is

A. $e^x \left(1 + x^2\right)^2$

B. $\dfrac{-xe^x}{(1+x^2)^2}$

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

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

Answer: D

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2. Let $f:(11,\infty)\to(0,\infty)$ be given by $f(x)=\prod_{l=l}^{10}\dfrac{1}{(x-1)}$

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3. $\displaystyle\int\frac{2^{x+1}-5^{x-1}}{10^x}dx$

A. $\dfrac{1}{5\log 2}2^{x+1}-\dfrac{2}{\log 5}5^{x-1}+C$

B. $\dfrac{2(x+1)}{5^{x+1}}-\dfrac{x}{2^x}+C$

C. $\dfrac{2(x+1)}{5^{x+1}}+\dfrac{x}{2^x}+C$

D. $\frac{1}{5\log 2}2^{2-x}+\frac{2}{\log 5}5^{-x}+C$

Answer: D

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4. The integral $\int\frac{dx}{(a^2-b^2x^2)^{3/2}}$ equals

A. $\frac{x}{\sqrt{a^2-b^2x^2}}+C$

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

C. $\frac{ax}{\sqrt{a^2-b^2x^2}}+C$

D. $\frac{1}{a^2\sqrt{a^2-b^2x^2}}+C$

Answer: B

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5. $\int\frac{7x^{13}+5x^{15}}{(x^7+x^2+1)^3}+C$ equals

A. $\frac{x^{14}}{(x^7+x^2+1)}+C$

B. $\frac{x^{14}}{2(x^7+x^2+1)^2}+C$

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

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

Answer: B

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6. if $\int\frac{1-5\sin^2 x}{\cos^5 x\sin^2 x}dx=\frac{f(x)}{\cos^5 x}+c$ then $f(x)$

A. $-\cos ecx$

B. cosec x

C. cot x

D. $-\cot x$

Answer: D

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7. If $\frac{1-x^9}{x(1+x^9)}dx = A\log|x| + B\log|1+x^9| + C$ then the ratio A : B is equal to

A. $-2:9$

B. $2:9$

C. $9:-2$

D. $9:2$

Answer: C

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8. If $\int \frac{dx}{x^3(1+x^6)^{23}} = xf(x)\left(1+x^6\right)^{\frac{1}{3}} + C$ where, C is a constant of integration, then the function f(x) is equal to

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

B. $-\frac{6}{x}$

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

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

Answer: D

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9. $\int \frac{x+2}{(x^2+3x+3)\sqrt{x+1}}dx$ is equal to

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

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

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

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

Answer: C

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10. If $I = \int \frac{e^x}{e^{4x} + e^{2e} + 1} dx$. $J = \int \frac{e^{-x}}{e^{-4x} + e^{-2x} + 1} dx$. Then for an arbitrary constant c, the value of $J - I$ equal to

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

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

Answer: C

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11. The integral $\int \frac{2}{e^{2x} - 1} dx$ is equal to (Here C is a constant of integration)

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

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

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

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

Answer: B

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