



MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

INDEFINITE INTEGRATION

SOLVED EXAMPLES

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

A. $x + c$

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

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

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

Answer: A



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

A. $2\sec x + c$

B. $\sec x + c$

C. $\operatorname{cosec} x + c$

D. $2\operatorname{cosec} x + c$

Answer: B



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$$3. \int \frac{\sin 2x}{1 + \cos^4 x} dx =$$

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

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

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

D. $-\tan^{-1}(\sin^{-1} x) + c$

Answer: B

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

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

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

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

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

Answer: A

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$$5. \int \frac{x+1}{\sqrt{2x+1}} dx =$$

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

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

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

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

Answer: A



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6. Evaluate the integrals.

$$\int \frac{x^2+1}{x^4+1} dx \text{ on } \mathbb{R}.$$

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

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

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

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

Answer: A

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$$7. \int \frac{1}{4 + 5\cos x} dx =$$

$$A. \frac{1}{3} \log \left| \frac{3 + \tan x/2}{3 - \tan x/2} \right| + c$$

$$B. \frac{1}{6} \log \left| \frac{3 + \tan x/2}{3 - \tan x/2} \right| + c$$

$$C. \frac{1}{6} \log \left| \frac{3 + \tan x/2}{3 - \tan x/2} \right| + c$$

D. none

Answer: A



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

A. $\frac{1}{25} \log|4\cos x + 3\sin x| + \frac{18}{25}x + c$

B. $\frac{1}{25} \log|4\cos x + 3\sin x| - \frac{18}{25}x + c$

C. $\frac{1}{25} \log|4\cos x - 3\sin x| + \frac{18}{25}x + c$

D. none

Answer: A

9. $\int \cos^{-1}(4x^3 - 3x) dx =$

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

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

C. $3x\cos^{-1}x - \sqrt{1-x^2} + c$

D. $3x\cos^{-1}x - 3\sqrt{1-x^2} + c$

Answer: D

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

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

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

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

D. $-\sin^2 x$

Answer: A

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11. If $\int \frac{dx}{(2\sin x + \sec x)^4} = At^5 + Bt^6 + Ct^7 + k$, where $t = (1 + \tan x)^{-1}$, then

$A + B + C =$

A. $\frac{-86}{105}$

B. $\frac{-01}{105}$

C. $\frac{-16}{105}$

D. $\frac{-26}{105}$

Answer: C

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

A. $\ln \left| \frac{\sqrt{x^4 + x^2 + 1}}{x} \right| + c$

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

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

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

Answer: B

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13. $\int (1 + \tan^2 x + \tan^4 x + \tan^6 x) dx =$

A. $\tan^2 x + \frac{\tan^5 x}{5} + c$

B. $\tan x + \frac{\tan^5 x}{5} + c$

C. $x + \frac{\tan^3 x}{3} + \frac{\tan^5 x}{5} + \frac{\tan^7 x}{7} + c$

D. $\tan x + \frac{\tan^3 x}{3} + \frac{\tan^5 x}{5} + \frac{\tan^7 x}{7} + c$

Answer: B

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14. If $\int \frac{e^x - e^{-x}}{e^{2x} + e^{-2x}} dx = A \ln \left| \frac{e^x + e^{-x} + B}{e^x + e^{-x} - B} \right| + c$ then $AB =$

A. 2

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

C. -2

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

Answer: D

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

A. $2 \tan^{-1} \sqrt{x^3+x^2} + c$

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

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

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

Answer: C

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$$16. \int \frac{2x^{12} + 5x^9}{(x^5 + x^3 + 1)^3} dx = \frac{x^p}{q(x^5 + x^3 + 1)^r} + c, \text{ then } p - q - r =$$

A. 6

B. 8

C. 10

D. 14

Answer: A

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$$17. \int \left(\frac{\sin 12x - \sin 9x}{2\cos 7x - 1} \right) dx =$$

A. $\frac{\cos 2x}{2} - \frac{\cos 5x}{5} + c$

B. $\frac{\cos 12x}{12} - \frac{\cos 9x}{9} + c$

C. $\frac{\cos 5x}{5} - \frac{\cos 2x}{2} + c$

D. $\frac{\cos 9x}{9} - \frac{\cos 12x}{2} + c$

Answer: A



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$$18. \text{ If } \int \frac{(1 - \cos x)^{2/7}}{(1 + \cos x)^{9/7}} dx = A \left(\tan \frac{x}{2} \right)^K + c, \text{ then } AK =$$

A. $\frac{11}{7}$

B. $\frac{121}{49}$

C. $\frac{49}{121}$

D. 1

Answer: D

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19. If $y(x - y)^2 = x$ then $\int \frac{dx}{x - 3y} =$

A. $\ln \left| (x - y)^2 - 1 \right| + c$

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

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

D. $\ln \left| (x - 3y)^2 - 1 \right| + c$

Answer: C

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20. If $\int \frac{(x \cos \alpha + 1) dx}{(x^2 + 2x \cos \alpha + 1)^{3/2}} = \frac{f(x)}{\sqrt{x^2 + 2x \cos \alpha + 1}} + c$ then $f(x) =$

A. x

B. x^2

C. $2x$

D. $2x^2$

Answer: A



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21. If $\int \frac{1 - (\cot x)^{2012}}{\tan x + (\cot x)^{2013}} dx = \frac{1}{k} \ln |(f(x))^k + (g(x))^k| + c$, then 'k'

A. 2011

B. 2012

C. 2013

D. 2014

Answer: D

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EXERCISE 1A

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

A. $x - \frac{4}{5}x^{5/4} + c$

B. $x + \frac{4}{5}x^{5/4} + c$

C. $x - \frac{2}{5}x^{5/4} + c$

D. $x - \frac{3}{5}x^{5/4} + c$

Answer: A

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$$2. \int \frac{1-x^4}{1-x} dx =$$

$$A. x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} + c$$

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

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

$$D. x^2 + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^5}{4} + c$$

Answer: B

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$$3. \int e^{3\log x} dx =$$

$$A. \frac{x^3}{3} + c$$

$$B. \frac{x^3}{3} + c$$

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

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

Answer: C

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4. Evaluate the integrals.

$$\int e^{\log(1+\tan^2 x)} dx \text{ on } I \subset \mathbb{R} \setminus \left\{ \frac{(2n+1)\pi}{2} : n \in \mathbb{Z} \right\}.$$

A. $\sin x + c$

B. $\cos x + c$

C. $\cot x + c$

D. $\tan x + c$

Answer: D

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$$5. \int \left(\frac{e^{5\log x} - e^{4\log x}}{e^{3\log x} - e^{2\log x}} \right) dx =$$

A. $x + c$

B. $3x^2 + c$

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

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

Answer: C

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$$6. \int \left[1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \right] dx =$$

A. $e^x + c$

B. $x + c$

C. $2e^x + c$

D. $2e^{2x} + c$

Answer: A

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$$7. \int \left(\sum_{r=0}^{\infty} \frac{x^r 2^r}{r!} \right) dx =$$

A. $e^x + c$

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

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

D. $2e^{2x} + c$

Answer: B



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8. $\int \cot^2 x dx =$

A. $-\cot x - x + c$

B. $\tan x - x + c$

C. $\cot x - x + c$

D. $\sin x - x + c$

Answer: A

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9. $\int \sin^2 x \sec^2 x dx =$

A. $-\cot x - x + c$

B. $\tan x - x + c$

C. $\cot x - x + c$

D. $\sin x - x + c$

Answer: B



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10. $\int \tanh^2 x dx =$

A. $x - \tanh x + c$

B. $x - \cosh x + c$

C. $x + \tanh x + c$

D. $x + \coth x - c$

Answer: A



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11. $\int (\tan x - \cot x)^2 dx =$

A. $\tan x + x + c$

B. $\tan x - x + c$

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

D. $\tan x - \cot x - 4x + c$

Answer: D



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

A. $x - \cos x + c$

B. $x + \cos x + c$

C. $2x - \cos x + c$

D. $x + \sin x + c$

Answer: A

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13. $\int \frac{\sin^2 x}{1 + \cos x} dx =$

A. $x + \sin x + c$

B. $x - \sin x + c$

C. $-x + \sin x + c$

D. $2x - \sin x + c$

Answer: B

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14. $\int \frac{1}{1 + \cos x} dx =$

A. $\cot x - \operatorname{cosec} x + c$

B. $-\cot x + \operatorname{cosec} x + c$

C. $-\cot x - \operatorname{cosec} x + c$

D. $\cot x - \sec x + c$

Answer: B

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15. $\int \sec^2 \operatorname{cosec}^2 x dx =$

A. $\tan x + x + c$

B. $\tan x - x + c$

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

D. $\tan x - \cot x - 4x + c$

Answer: C

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16. $\int \frac{1}{1 + \cos 2x} dx =$

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

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

C. $2 \tan x + c$

D. $-2 \tan x + c$

Answer: A

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17. $\int \frac{1 + \sin^2 x}{1 + \cos 2x} dx =$

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

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

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

D. $2\tan x - \frac{1}{2}x + c$

Answer: B

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

A. $a \tan x + b \sec x + c$

B. $a \tan x - b \sec x + c$

C. $a \tan x + b \cot x + c$

D. $a \sin x + b \sec x + c$

Answer: A

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

A. $2\cot x - 3\operatorname{cosec} x + c$

B. $-2\cot x + 3\operatorname{cosec} x + c$

C. $-2\cot x + \operatorname{cosec} x + c$

D. $\cot x + 5\operatorname{cosec} x + c$

Answer: B

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20. $\int \sqrt{1 - \sin 2x} dx =$

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

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

C. $2\sin x - \cos x + c$

D. $\sin x - 2\cos x + c$

Answer: B



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21. If $x \in (-\pi/2, \pi/2)$ then $\int \sqrt{1 + \cos 2x} dx =$

A. $2\sqrt{2}\sin x + c$

B. $\sqrt{3}\sin x + c$

C. $\sqrt{2}\sin x + c$

D. $3\sqrt{2}\sin x + c$

Answer: C



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22. $\int \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} dx =$

A. $-x + c$

B. $x + c$

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

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

Answer: B

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

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

B. $\tan x + \cot x + c$

C. $\sec x - \operatorname{cosec} x + c$

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

Answer: C



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$$24. \int \frac{3\cos^2 x + 4\sin^2 x}{\cos^2 x \sin^2 x} dx =$$

A. $-3\cot x + 2\tan x + c$

B. $3\cot x + 4\tan x + c$

C. $-3\cot x + 4\tan x + c$

D. $-3\cot x - 4\tan x + c$

Answer: C



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

A. $a\operatorname{cosec} x + b\operatorname{sec} x + c$

B. $-a\operatorname{cosec} x + b\operatorname{sec} x + c$

C. $-a\operatorname{cosec}x - b\operatorname{sec}x + c$

D. $a - \operatorname{cosec}x + a\operatorname{sec}x + c$

Answer: B

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26. If $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx = A\sin 2x + B$, then $A =$

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

B. -1

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

D. 1

Answer: A

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$$27. \int \frac{e^x dx}{\cosh x + \sinh x} =$$

A. $\log \cosh x + c$

B. $2 \log(\cosh x + \sinh^{-1} x) + c$

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

D. $x + c$

Answer: D



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$$28. \int \frac{\sinh x}{1 + \sinh^2 x} dx$$

A. $\operatorname{sech} x + c$

B. $-\operatorname{sech} x + c$

C. $\tanh x + c$

D. none

Answer: B

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

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30. $\int (1 - \cos x) \operatorname{cosec}^2 x dx = f(x) + c \Rightarrow f(x) =$

A. $\sqrt{\cot x + \operatorname{cosec} x} + c$

B. $\tan x/2 + c$

C. $\log|\operatorname{cosec} x - \cot x| + c$

D. none

Answer: A

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31. $\int (1 - \cos x) \operatorname{cosec}^2 x dx = f(x) + c \Rightarrow f(x) =$

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

B. $\cot \frac{x}{2}$

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

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

Answer: A

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

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

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

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

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

Answer: D

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$$33. \int \frac{x^4}{x^2 + 1} dx$$

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

$$B. \frac{x^5}{5} + \tan^{-1}x + c$$

$$C. 4x^3 + \tan^{-1}x + c$$

$$D. \frac{x^4}{4} + x + \tan^{-1}x + c$$

Answer: A

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$$34. \int \frac{x^5}{x^2 + 1} dx =$$

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

$$B. \frac{x^4}{4} - \frac{x^2}{2} + \frac{1}{2} \log(x^2 + 1) + c$$

$$C. \frac{x^4}{4} + \frac{x^2}{2} + \tan^{-1}x + c$$

$$D. \frac{x^4}{4} - \frac{x^3}{3} - \tan^{-1}e$$

Answer: B



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$$35. \int \frac{1}{x} \left[\frac{\sqrt{x-1}}{\sqrt{x+1}} \right] dx =$$

$$A. \cosh^{-1}x - \sec^{-1}x + c$$

$$B. \cosh^{-1}x + \sec^{-1}x + c$$

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

D. $\sinh^{-1}x - \operatorname{cosec}^{-1}x + c$

Answer: A

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36. $\int \left[\frac{1}{\sqrt{1-x^2}} + 2^x + e^x \right] dx =$

A. $\sin^{-1}x + \frac{2^x}{\log 2} + e^x + c$

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

C. $\sin^{-1}x + \frac{3^x}{\log 3} + e^x + c$

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

Answer: A

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$$37. \int \frac{\sqrt{1-x^2} + \sqrt{1+x^2}}{\sqrt{1-x^4}} dx =$$

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

B. $\sinh^{-1}x - \sin^{-1}x + c$

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

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

Answer: A

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$$38. \int 2^{3x} 3^{2x} 5^x dx =$$

A. $\frac{2^{3x} 3^{2x} 5^x}{\log(720)} + c$

B. $\frac{2^{3x} 3^{2x} 5^x}{\log(360)} + c$

C. $\frac{2^{3x} 3^{2x} 5^x}{\log(180)} + c$

$$D. \frac{2^{3x}3^{2x}5^x}{\log(90)} + ce$$

Answer: B

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$$39. \int \frac{(a^x + b^x)^2}{a^x b^x} dx =$$

$$A. \frac{(a/b)^x + (b/a)^x}{\log a + \log b} - 2x + c$$

$$B. \frac{(a/b)^x + (b/a)^x}{\log a - \log b} - 2x + c$$

$$C. \frac{(a/b)^x - (b/a)^x}{\log a - \log b} + 2x + c$$

$$D. \frac{(a/b)^x + (b/a)^x}{\log a + \log b} + 2x + c$$

Answer: C

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$$40. \int e^{3-5x} dx =$$

$$A. -\frac{1}{5}e^{3-5x} + c$$

$$B. \frac{1}{5}e^{3-5x} + c$$

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

$$D. -\frac{1}{5}e^{3-5x} + c$$

Answer: A



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$$41. \int e^{x \log a} e^x dx =$$

$$A. e^{x \log a} + e^x + c$$

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

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

$$D. \frac{(ae^x)}{\log a} + c$$

Answer: B

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$$42. \int \frac{1}{\sqrt{4-5x}} dx =$$

A. $\frac{3}{5}\sqrt{4-5x} + c$

B. $-\frac{2}{5}\sqrt{4-5x} + c$

C. $\frac{2}{5}\sqrt{4-5x} + c$

D. $-\frac{2}{5}\sqrt{4+5x} + c$

Answer: B

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$$43. \int \frac{1}{(2-3x)^2} dx =$$

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

B. $\frac{4}{3(2 - 3x)} + c$

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

D. $\frac{2}{(2 - 3x)} + c$

Answer: A

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44. $\int \frac{1}{x^2 + 4x + 4} dx =$

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

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

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

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

Answer: B



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45. $\int \sec^2 5x dx =$

A. $\frac{2}{1} \tan 5x + c$

B. $\frac{1}{2} \tan 5x + c$

C. $\frac{1}{5} \tan 5x + c$

D. $\frac{1}{3} \tan 3x + c$

Answer: C



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46. $\int \sec x / 3 \tan x / 3 dx$

A. $3 \sec x / 3 + c$

B. $2 \sec x / 2 + c$

C. $\sec x/3 - c$

D. $2\sec x/3 + c$

Answer: A

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47. $\int \sin^2 x \cos^2 x dx =$

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

B. $\frac{1}{8} \left(x - \frac{\sin 4x}{4} \right) + c$

C. $\frac{1}{8} \left(x + \frac{\sin 4x}{4} \right) + c$

D. none

Answer: B

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48. $\int \cos^3 x dx =$

A. $\frac{3}{4} \sin x + \frac{1}{12} \sin 3x + c$

B. $\frac{3}{4} \sin x - \frac{1}{12} \sin 3x + c$

C. $-\frac{3}{4} \sin x + \frac{1}{12} \sin 3x + c$

D. $-\frac{3}{4} \sin x - \frac{1}{12} \sin 3x + c$

Answer: A

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49. Evaluate the integrals.

$\int \sin^3 x dx$ on R .

A. $\frac{1}{8} \left[3x + 2\sin 2x - \frac{1}{2} \sin 4x \right] + c$

B. $\frac{1}{8} \left[3x - 2\sin 2x + \frac{1}{2} \sin 4x \right] + c$

C. $\frac{1}{8} \left[3x - 2\sin 2x - \frac{1}{4}\sin 4x \right] + c$

D. none

Answer: B

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50. $\int \sin^2 x \cos^4 x dx =$

A. $\frac{x}{16} + \frac{\sin 2x}{64} + \frac{\sin 4x}{64} + \frac{\sin 6x}{192} + c$

B. $\frac{x}{6} + \frac{\sin 2x}{34} - \frac{\sin 4x}{44} - \frac{\sin 6x}{192} + c$

C. $\frac{x}{16} + \frac{\sin 2x}{64} - \frac{\sin 4x}{64} - \frac{\sin 6x}{192} + c$

D. none

Answer: C

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$$51. \int \sin 5x \cos 3x dx =$$

$$A. \frac{1}{2} \left[\frac{\cos 2x}{2} + \frac{1}{8} \cos 8x \right] + c$$

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

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

D. none

Answer: C

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$$52. \int \cos 4x \cos 3x dx =$$

$$A. \frac{1}{2} \left[-\frac{1}{7} \sin 7x + \sin \right] + c$$

$$B. \frac{1}{2} \left[\frac{1}{7} \sin 7x + \sin \right] + c$$

$$C. \frac{1}{2} \left[\frac{1}{7} \sin 7x - \sin \right] + c$$

D. none

Answer: B

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53. $\int \cos x \cos 2x \cos 3x dx =$

A. $\frac{1}{4} \left[\frac{1}{6} \sin 6x + \frac{1}{2} \sin - \frac{1}{4} \sin 4x + x \right] + c$

B. $\frac{1}{4} \left[\frac{1}{6} \sin 6x - \frac{1}{2} \sin - \frac{1}{4} \sin 4x + x \right] + c$

C. $\frac{1}{4} \left[\frac{1}{6} \sin 6x + \frac{1}{2} \sin 2x + \frac{1}{4} \sin 4x + x \right] + c$

D. none

Answer: C

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54. $\int \sqrt{1 + \cos x} dx =$

A. $\sqrt{2} \sin x/2 + c$

B. $2\sqrt{2} \sin x/2 + c$

C. $3\sqrt{2} \sin x/2 + c$

D. none

Answer: B

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

A. $2\sin x/2 + 2\cos x/2 + c$

B. $2\sin x/2 - \cos x + c$

C. $2\sin x/2 - \cos x/2 + c$

D. none

Answer: C



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56. If $x \in (-\pi, \pi)$ then $\int \sqrt{1 + \sin x/2} dx =$

A. $2[\sin x/4 - \cos x/4] + c$

B. $4[\sin x/4 + \cos x/4] + c$

C. $4[\sin x/4 - \cos x/2] + c$

D. $4[\sin x/4 - \cos x/4] + c$

Answer: D



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

A. $2\cot x/2 - x + c$

B. $-2\cot x/2 - x + c$

C. $-2\cot x/2 + x + c$

D. none

Answer: B

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

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

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

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

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

Answer: D



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59. $\int x \cos(x^2) dx =$

A. $\frac{1}{2} \sin(x^2) + c$

B. $\frac{1}{3} \sin(x^2) + c$

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

D. none

Answer: A



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60. $\int x \sin(-x^2) dx =$

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

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

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

D. none

Answer: B

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61. $\int x^2 \sin(x^3) dx$

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

B. $\frac{1}{3}\cos(x^3) + c$

C. $-\frac{1}{3}\sin(x^3) + c$

D. none

Answer: A

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62. $\int x^3 \sec^2(x^4) dx =$

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

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

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

D. none

Answer: C



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63. $\int 2x(x^2 + 1)^5 dx =$

A. $\frac{1}{6}(x^2 + 1)^6 + c$

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

C. $-\frac{1}{6}(x^2 + 1)^6 + c$

D. $\frac{1}{6}(x^2 + 1)^6 + c$

Answer: D

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64. $\int \frac{x}{\sqrt{x^2 + 1}} dx =$

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

B. $2\sqrt{x^2 + 1} + c$

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

D. none

Answer: A

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65. $\int (4x + 3)\sqrt{2x^2 + 3x + 5} dx =$

A. $\frac{1}{3}(2x^2 + 3x + 5)^{3/2} + c$

B. $\frac{2}{3}(2x^2 + 3x + 5)^{3/2} + c$

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

D. $\frac{2}{3}(2x^2 + 3x + 5)^{3/2} + c$

Answer: D

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66. $\int \frac{1}{\sin x \cos^2 x} dx =$

A. $\log \left| \tan \frac{x}{2} \right| + \sec x + c$

B. $\log \left| \tan \frac{x}{2} \right| - \sec x + c$

C. $\log \left| \tan \frac{x}{2} \right| + \sec x + c$

D. none

Answer: A

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$$67. \int \frac{\cos 2x}{(\cos x - \sin x)^2} dx =$$

A. $\log| -1\sin 2x| + c$

B. $\log|\cos x \sin x| + c$

C. $-\log|\cos x - \sin x| + c$

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

Answer: C

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$$68. \int \frac{1 + \cos 4x}{\cot x - \tan x} dx =$$

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

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

$$\text{C. } \frac{1}{4}\sin 4x + c$$

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

Answer: B

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$$69. \int \frac{\sin^{-1}x}{\sqrt{1-x^2}} dx =$$

$$\text{A. } \frac{1}{2}\sin^{-1} + c$$

$$\text{B. } \frac{1}{2}(\sin^{-1}x)^2 + c$$

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

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

Answer: B



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$$70. \int \frac{1}{(1+e^x)(1+e^{-x})} dx =$$

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

B. $\frac{1}{1+e^x} + c$

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

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

Answer: A



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$$71. \int \frac{\sin^6 x}{\cos^8 x} dx =$$

A. $\tan 7x + c$

B. $\frac{1}{9}\tan^9x + c$

C. $\frac{1}{7}\tan^7x + c$

D. $\sec^{2x} + c$

Answer: B

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72. $\int \frac{\tan^9x}{\sin x \cos x} dx =$

A. $\frac{1}{10}\tan^9x + c$

B. $\frac{1}{5}\tan^9x + c$

C. $\frac{1}{7}\tan^9x + c$

D. none

Answer: B

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$$73. \int \frac{\sec x}{a \cos x + b \sin x} dx =$$

A. $\frac{1}{a} \log |a \cot x + b| + c$

B. $a \log |a + b \tan x| + c$

C. $b \log |a + b \tan x| + c$

D. $\frac{1}{b} \log |a + b \tan x| + c$

Answer: D

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$$74. \int \frac{1}{\sqrt{x}(1+x)} dx =$$

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

B. $\tan^{-1}(\sqrt{x}) + c$

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

D. none

Answer: A

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$$75. \int \frac{x \sin^{-1}(x^2)}{\sqrt{1-x^4}} dx =$$

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

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

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

D. none

Answer: A

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$$76. \int \frac{\cos(\cot^{-1}x)}{1+x^2} dx =$$

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

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

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

D. none

Answer: C

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$$77. \int \frac{x^{49} \tan^{-1}(x^{50})}{(1+x^{100})} dx = k \left(\tan^{-1}(x^{50}) \right)^2 + c \Rightarrow k =$$

A. $1/50$

B. $-1/50$

C. $1/100$

D. $-1/100$

Answer: C

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78. $\int \frac{x + \sin^{-1}x}{\sqrt{1-x^2}} = dx$

A. $-\sqrt{1-x^3} + (1/2)(\sin^{-1}x)^2 + c$

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

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

D. none

Answer: A

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$$79. \int \frac{\tan(\sin^{-1}x)}{\sqrt{1-x^2}} dx =$$

A. $\log \left| \sin(\sin^{-1}) \right| + c$

B. $-\log \left| \cos(\sin^{-1}x) \right| + c$

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

D. none

Answer: B

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$$80. \int \frac{e^x}{\sqrt{1+(e^x)}} dx =$$

A. $\sqrt{e^x - 1} + c$

B. $\sqrt{e^x + 1} + c$

C. $3\sqrt{e^x + 1} + c$

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

Answer: D

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81. $\int \frac{1}{\sqrt{x}} \cos(\sqrt{x}) dx =$

A. $3\sin\sqrt{x} + c$

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

C. $\sin\sqrt{x} + c$

D. none

Answer: B

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$$82. \int \frac{2}{x[1 + (\log x)^2]} dx =$$

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

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

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

D. none

Answer: C



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$$83. \int \sin^3 x \cos x dx =$$

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

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

C. $\frac{1}{3} \sin^4 x + c$

D. none

Answer: B

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84. $\int \sec^2 x \tan^2 x dx =$

A. $\frac{1}{2} \tan^3 x + c$

B. $\tan^3 x + c$

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

D. none

Answer: C

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85. $\int \sin^{5/2}x \cos^3x dx =$

A. $2\sin^{7/2}x \left[\frac{1}{7} + \frac{1}{11} \sin^2x \right] + c$

B. $2\sin^{7/2}x \left[\frac{1}{7} - \frac{1}{11} \sin^2x \right] + c$

C. $3\sin^{7/2}x \left[\frac{1}{5} - \frac{1}{9} \sin^2x \right] + c$

D. none

Answer: B

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86. $\int \tan^4x dx =$

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

B. $\tan^3x - \tan x - x + c$

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

D. $\tan^3 x - \tan x + x + c$

Answer: C

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

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

B. $\cot(xe^x) - c$

C. $\cot(xe^x) + c$

D. none

Answer: A

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

A. $\cot(xe^x) + c$

B. $\tan(xe^x) + c$

C. $\sin(xe^x) + c$

D. none

Answer: B



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89. $\int e^{\sin^2 x + \cos x} (\sin 2x - \sin x) dx =$

A. $-e^{\sin^2 x + \cos x} + c$

B. $e^{\sin^2 x + \cos x} + c$

C. $2e^{\sin^2 x + \cos x} + c$

D. none

Answer: B

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90. $\int \frac{x^3}{\sqrt{1-x^8}} dx =$

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

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

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

D. none

Answer: A

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$$91. \int \left[\frac{\sqrt{x}}{\sqrt{a^3 - x^3}} \right] dx = g(x) + c \Rightarrow g(x) =$$

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

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

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

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

Answer: C

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$$92. \int \frac{dx}{x^2 \sqrt{4 + x^2}} =$$

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

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

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

D. $\frac{9}{4x}\sqrt{4+x^2} + c$

Answer: C

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

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

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

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

D. none

Answer: A

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94. $\int \frac{x^3}{1+x^8} dx =$

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

B. $\frac{1}{3} \tan^{-1} x^4 + c$

C. $\frac{1}{4} \tan^{-1} x^4 + c$

D. none

Answer: C



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95. $\int \frac{x^4 + 1}{1+x^6} dx =$

A. $\tan^{-1}(x) - \tan^{-1} x^3 + c$

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

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

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

Answer: D

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$$96. \int \frac{x^3 - 1}{x^3 + x} dx =$$

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

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

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

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

Answer: B

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97. $\int \frac{x^3 + 1}{x^2 + 1} dx$

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

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

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

D. none

Answer: A



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

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

B. $(x^4 + 1)^{1/4} + c$

$$C. -(x^4 + 1)^{1/4} + c$$

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

Answer: D

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99. the integral $\int \frac{2x^{12} + 5x^9}{(x^5 + x^3 + 1)^3} dx$ is equal to

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

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

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

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

Answer: B



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$$100. \int \frac{\sin 2x}{1 + \sin^4 x} dx =$$

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

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

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

D. none

Answer: A



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$$101. \int \frac{1 + \cos x}{(x + \sin x)^2} dx =$$

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

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

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

D. none

Answer: C

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

A. $\sqrt{x^2 + 2x + 3} + c$

B. $2\sqrt{x^2 + 2x + 3} + c$

C. $-\sqrt{x^2 - 2x - 3} + c$

D. none

Answer: A

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$$103. \int \frac{1}{\sqrt{e^{2x} - 1}} dx =$$

A. $\tan^{-1}(e^{-x}) + c$

B. $\sin^{-1}(e^{-x}) + c$

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

D. none

Answer: C



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$$104. \int \frac{\cos x}{\sqrt{2 + 3\sin x}} dx =$$

A. $\frac{2}{3}\sqrt{2 + 3\sin x} + c$

B. $\frac{2}{3}\sqrt{2 + 3\sin x} - c$

C. $\frac{2}{3}\sqrt{2 - 3\sin x} + c$

D. none

Answer: A

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

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

B. $\frac{1}{b-a} \log + |\cos^2 x - b \sin^2 x| c$

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

D. none

Answer: C

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$$106. \int \frac{\log\left(1 + \frac{1}{x}\right)}{x(1+x)} dx =$$

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

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

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

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

Answer: B

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$$107. \int \frac{\sec x}{(\sec x + \tan x)^2} dx =$$

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

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

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

D. none

Answer: A

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108. $\int \frac{\sec x}{\sqrt{\sec x + \tan x}} dx =$

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

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

C. $2\sqrt{\sec x + \tan x} + c$

D. none

Answer: A

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

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

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

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

D. none

Answer: B

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$$110. \int \sec x \log(\sec x + \tan x) dx =$$

$$A. [\log(\sec x + \tan x)]^2 + c$$

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

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

D. $\frac{1}{3}[\log(\sec x + \tan x)]^2 + c$

Answer: C

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111. $\int (1 + 2)\tan x(\tan x + \sec x)\}^{1/2} dx =$

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

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

C. $\log\left|\frac{\sec x}{\sec x + \tan x}\right| + c$

D. $\log|\cos x(\sec x + \tan x)| + c$

Answer: B

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112. $\int \csc x \log(\csc x - \cot x) dx =$

A. $\frac{1}{2} \log^2(\csc x + \cot) + c$

B. $\frac{1}{2} \log^2(\csc x - \cot) + c$

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

D. $\frac{1}{3} \log^2(\csc x - \cot) + c$

Answer: B

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113. $\int \frac{\sec^2 x}{\sqrt{a + b \tan x}} dx =$

A. $\frac{1}{b} 2\sqrt{a + b \tan x} + c$

B. $-\frac{1}{b} 2\sqrt{a + b \tan x} + c$

C. $\frac{1}{b} 2\sqrt{a - b \tan x} + c$

D. none

Answer: A

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114. $\int \frac{\log(\tan x)}{\sin x \cos x} dx =$

A. $\log^2(\tan x) + c$

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

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

D. none

Answer: B

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115. $\int \frac{\left[x + \sqrt{a^2 + x^2} \right]^n}{\sqrt{a^2 + x^2}} dx (n \neq 0) =$

A. $\frac{1}{n+1} \left(x + \sqrt{a^2 + x^2} \right)^{n+1} + c$

B. $\frac{1}{n \cdot \left(x + \sqrt{a^2 + x^2} \right)^n} + c$

C. $\left(x + \sqrt{a^2 + x^2} \right)^n + c$

D. $\frac{1}{n} \left(x + \sqrt{a^2 + x^2} \right)^n + c$

Answer: D

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

A. $5\pi/4$

B. $-5\pi/4$

C. $\pi/4$

D. $3\pi/4$

Answer: B



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$$117. \int \frac{\sin x \cos x}{\sin^4 + \cos^4 x} dx =$$

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

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

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

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

Answer: C



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$$118. \int \frac{\sin x \cos x}{1 + \cos^4 x} dx =$$

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

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

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

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

Answer: A

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119. $\int \frac{\sec^2 x}{\log(\tan x)^{\tan x}} dx =$

A. $\log |\log(\tan x)^{\tan x}| + c$

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

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

D. $\log \left| \frac{\log \tan x}{\tan x} \right| + c$

Answer: C



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$$120. \int \sec^m x \cdot \tan x dx =$$

A. $\frac{1}{m} \sec^m x + c$

B. $-\frac{1}{m} \sec^m x + c$

C. $\frac{1}{\cos^m x} + c$

D. none

Answer: A



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$$121. \int \frac{dx}{\sqrt{\sin^3 x \cos x}} = g(x) + c \Rightarrow g(x) =$$

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

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

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

D. $\frac{-2}{\sqrt{\cot x}}$

Answer: A

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122. $\int \frac{x^3}{1+x^4} dx =$

A. $\frac{1}{4} \log |1 - x^4| + c$

B. $\frac{1}{2} \log |1 + x^4| + c$

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

D. none

Answer: C

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$$123. \int \frac{x - 2}{x^2 - 4x + 5} dx =$$

$$A. \frac{1}{2} \log |x^2 - 4x - 5| + c$$

$$B. \frac{1}{4} \log |x^2 - 4x + 5| + c$$

$$C. \frac{1}{2} \log |x^2 + 4x + 5| + c$$

$$D. \frac{1}{2} \log |x^2 - 4x + 5| + c$$

Answer: D



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$$124. \int \frac{dx}{x(1 + \log x)^3} =$$

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

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

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

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

Answer: A

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$$125. \int \frac{1 + \log x}{1 + x \log x} dx =$$

A. $\log|1 + x \log x| + c$

B. $\log|x \log x| + c$

C. $\log|1 + \log x| + c$

D. $1 + x \log x + c$

Answer: A

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126. Evaluate the integrals.

$$\int \frac{1}{x \log x [\log(\log x)]} dx \text{ on } (1, \infty)$$

A. $\log|\log(\log x)| + c$

B. $\log|\log \sin x| + c$

C. $1/\log \sin x + c$

D. none

Answer: A

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127. $\int \frac{1}{\log(x^x)(\log x + 1)} dx =$

A. $\log|\log x + 1| + c$

B. $\log \left| \frac{\log x + 1}{\log x} \right| + c$

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

D. none

Answer: C

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

A. $-\log|\cos 2x - \sin 3x| + c$

B. $\log|\cos 2x - \sin 3x| + c$

C. $\log|\cos 2x + \sin 3x| + c$

D. none

Answer: C

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$$129. \int \frac{\cot x}{\log(\sin x)} dx =$$

A. $\log|\log(\sin x)| + c$

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

C. $\log|\log(\cos x)| + c$

D. none

Answer: A



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$$130. \int \frac{1 - \tan x}{1 + \tan x} dx =$$

A. $\log|\cos x - \sin x| + c$

B. $\log|\cos x + \sin x| + c$

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

D. none

Answer: B

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

A. $\log \left| \cot^{-1}x \right| + c$

B. $\log \left| \tan^{-1}x \right| + c$

C. $\log \left| \cos^{-1}x \right| + c$

D. none

Answer: B

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132. $\int \frac{\sec^2x}{3+4\tan x} dx =$

A. $\frac{1}{2}\log|2 + 4\tan x| + c$

B. $\frac{1}{4}\log|3 + 4\tan x| + c$

C. $\frac{1}{4}\log|3 - 4\tan x| + c$

D. $\frac{1}{4}\log|2 + 3\tan x| + c$

Answer: B

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133. $\int \sec x \operatorname{cosec} x dx =$

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

B. $-\log|\tan x| + c$

C. $\log|\sin x| + c$

D. none

Answer: A

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$$134. \int \frac{-a\sin x + b\cos x}{b\sin x + a\cos x} dx =$$

A. $\log|b + a\tan x| + c$

B. $\frac{1}{a+b} \log|a\cos x + b\sin x| + c$

C. $\log|b\cos x - a\sin x| + c$

D. $\log|a\cos x + b\sin x| + c$

Answer: D

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$$135. \int \frac{f'(x)}{f(x)\log f(x)} dx =$$

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

B. $f(x) \cdot \log f(x) + c$

C. $\log|\log f(x)| + c$

D. none

Answer: C

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136. $\int \frac{\cos x}{\sin x \log \sin x} dx =$

A. $\log|\sin x \log \sin x| + c$

B. $\log|\log \sin x| + c$

C. $1/\log \sin x + c$

D. none

Answer: B

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137. $\int x^{-2/3} (1 + x^{1/2})^{-5/3} dx =$

A. $3(1 + x^{-1/2})^{-1/3} + c$

B. $3(1 + x^{-1/2})^{-2/3} + c$

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

D. none

Answer: B

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

A. $\log(x + \sqrt{x}) + c$

B. $\log(1 + \sqrt{x}) + c$

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

D. $2\log(1 + \sqrt{x}) + c$

Answer: D

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139. $\int \frac{1}{\sec x + \tan x} dx =$

A. $-\log|1 + \sin x| + c$

B. $\log|1 + \sin x| + c$

C. $\log|1 - \sin x| + c$

D. none

Answer: B

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140. $\int \frac{\tan x - \tan x/2}{1 + \tan x \tan x/2} dx =$

A. $2\log|\sec x/2| + c$

B. $2\log|\cos x/2| + c$

C. $2\log|\cos x/2| + c$

D. none

Answer: A

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141. $\int \frac{1 - \tan x/2}{1 + \tan x/2} dx =$

A. $2\log|\sec x/2| + c$

B. $2\log|\cos x/2| + c$

C. $2\log|\sec(\pi/4 - x/2)| + c$

D. $2\log|\cos(\pi/4 - x/2)| + c$

Answer: D

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142. $\int \left[\tan \frac{x}{2} + \tan \left(\frac{\pi}{2} - \frac{x}{2} \right) \right] dx =$

A. $2\log |\tan x/2| + c$

B. $2\log |\sin x/2 + \cos x/2| + c$

C. $\log|\cot x/2| + c$

D. none

Answer: A

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$$143. \int \frac{f'(x)}{\sqrt{f(x)}} dx =$$

A. $\frac{1}{2} \log|f(x)| + c$

B. $\sqrt{f(x)} + c$

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

D. none

Answer: C

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$$144. \int \frac{\sin 5x}{\sqrt{\cos 5x}} dx =$$

A. $\frac{2}{3} \sqrt{\cos 5x} + c$

B. $-\frac{2}{5} \sqrt{\cos 5x} + c$

C. $10\sqrt{\cos 5x} + c$

D. none

Answer: B

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$$145. \int \frac{1}{\cos x \sqrt{\sin x \cos x}} dx =$$

A. $\sqrt{\tan x} + c$

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

C. $2\sqrt{\cot x} + c$

D. $\sqrt{\cos x} + c$

Answer: B

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$$146. \int \frac{\sqrt{\cot x}}{\sin x \cos x} dx = -f(x) + c \Rightarrow f(x) =$$

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

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

C. $-2\sqrt{\cot x} + c$

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

Answer: C



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$$147. \int \frac{\sqrt{\cot x}}{\sin x \cos x} dx = -f(x) + c \Rightarrow f(x) =$$

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

B. $-2\sqrt{\tan x}$

C. $-2\sqrt{\cot x}$

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

Answer: D

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

A. $\log|e^x + e^{-x}| + c$

B. $\log|e^x - e^{-x}| + c$

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

D. none

Answer: A

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149. Evaluate the integrals.

$$\int \frac{dx}{1 + e^x}, x \in \mathbb{R}$$

A. $-\log|1 + e^{-x}| + c$

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

C. $\log|1 + e^x| + c$

D. none

Answer: A

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150. $\int \frac{e^x}{e^{x/2} - 1} dx =$

A. $2 \left[e^{x/2} - 1 - \log|e^{x/2} + 1| \right] + c$

B. $2 \left[e^{x/2} + 1 + \log|e^{x/2} + 1| \right] + c$

C. $2 \left[e^{x/2} + 1 - \log|e^{x/2} + 1| \right] + c$

$$D. 2 \left[e^{x/2} - 1 + \log \left| e^{x/2} - 1 \right| \right] + c$$

Answer: D

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151. If $\int \frac{e^x - 1}{e^x + 1} dx = f(x) + c$, then $f(x) =$

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

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

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

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

Answer: C

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

A. $(x + 1)e^{x+1/x} + c$

B. $-xe^{x+1/x} + c$

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

D. $xe^{x+1/x} + c$

Answer: D

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153. $\int \frac{e^x + e^{-x}}{(e^x - e^{-x}) \log \sinh x} dx =$

A. $\log|\cosh x| + c$

B. $\log(\log \cosh x) + c$

C. $\log(\log \sinh x) + c$

D. none

Answer: C

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154. $\int 5^{5^{5^x}} \cdot 5^{5^x} \cdot 5^x dx =$

A. $\frac{5^{5^x}}{(\log 5)^3} + c$

B. $5^{5^x} (\log 5)^3 + c$

C. $\frac{5^{5^{5^x}}}{(\log 5)^3} + c$

D. none

Answer: C

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$$155. \int \frac{(x^2 - 1)dx}{(x^4 + 3x^2 + 1)\tan^{-1}\left(\frac{x^2+1}{x}\right)} =$$

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

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

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

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

Answer: C

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$$156. \int \frac{\cos 2x}{\cos x} dx =$$

A. $\sin x - \log|\sec x - \tan x| + c$

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

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

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

Answer: D

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

A. $\cos a \log|\sin x| - x \sin a + c$

B. $\cos a \log|\sin x| + x \sin a + c$

C. $\cos a \log|\sin x| + x \tan a + c$

D. none

Answer: B

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

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

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

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

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

Answer: D



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

A. $x \cos(b - a) + \sin(b - a) \log |\sin(x - b)| + c$

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

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

D. none

Answer: A

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160. $\int \frac{\sin(x - a)}{\cos(x - b)} dx =$

A. $\cos(b + a)\log|\sec(x + b)| + x\sin(b - a) + c$

B. $\cos(b - a)\log|\sec(x - b)| + x\sin(b - a) + c$

C. $\cos(b - a)\log|\sec(x - b)| + x\sin(b - a) + c$

D. none

Answer: B

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$$161. \int \frac{1}{\sin(x-a)\sin(x-b)} dx =$$

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

$$B. \frac{1}{\sin(b+a)} \log \left| \frac{\sin(x-b)}{\sin(x-a)} \right| + c$$

$$C. \frac{1}{\sin(b-a)} \log \left| \frac{\sin(x-b)}{\sin(x-a)} \right| + c$$

D. none

Answer: C

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$$162. \int \frac{dx}{\cos(x+4)\cos(x+2)} =$$

$$A. \frac{1}{\sin} \log | \cos(x+4)^2 | + c$$

$$B. \frac{1}{2} \log \left| \frac{\sin(x+2)}{\sin(x+2)} \right| + c$$

$$C. \frac{1}{\sin 2} \log \left| \frac{\sec(x+4)}{\sin(x+2)} \right| + c$$

$$D. \log \left| \frac{\sin(x+4)}{\sin(x+2)} \right| + c$$

Answer: C

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$$163. \int \left[\frac{\sqrt{\sin(x+\alpha)}}{\sin(x-\alpha)} \right] dx =$$

A. $\sin \cdot \cosh^{-1} \left(\frac{\sin x}{\sin \alpha} \right) - \cos \alpha \cdot \sin^{-1} \left(\frac{\cos x}{\cos \alpha} \right) + c$

B. $\sin \cdot \cosh^{-1} \left(\frac{\sin x}{\sin \alpha} \right) - \tan \alpha \cdot \sin^{-1} \left(\frac{\cos x}{\cos \alpha} \right) + c$

C. $\sin \cdot \cosh^{-1} \left(\frac{\sin x}{\sin \alpha} \right) + \cos \alpha \cdot \sin^{-1} \left(\frac{\cos x}{\cos \alpha} \right) + c$

D. none

Answer: A

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$$164. \int \frac{f(x)g'(x) - f'(x)g(x)}{f(x)g(x)} [\log(g(x)) - \log(f(x))] dx =$$

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

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

C. $\frac{g(x)}{f(x)} \log\left(\frac{\log g(x)}{f(x)}\right) + c$

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

Answer: B



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EXERCISE 1B

1. $\int \frac{3dx}{2x^2 - x - 1} =$

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

$$\text{B. } \log \left| \frac{x+1}{x+1} \right| + c$$

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

$$\text{D. } \log \left| \frac{x-1}{2x+1} \right| + c$$

Answer: D

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

$$\text{A. } \log \left| \frac{x-1}{x-2} \right| + c$$

$$\text{B. } \log \left| \frac{x-2}{x-1} \right| + c$$

$$\text{C. } \log \left| \frac{x+2}{x+1} \right| + c$$

D. none

Answer: B

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

A. $\frac{2}{5} \log|2x + 1| - \frac{11}{15} \log|1 - 3x| + c$

B. $\frac{2}{5} \log|2x + 1| - \frac{11}{15} \log|1 + 3x| + c$

C. $\frac{2}{3} \log|2x - 1| + \frac{11}{15} \log|1 - 3x| + c$

D. $\frac{2}{5} \log|2x + 1| - \frac{21}{5} \log|1 + 3x| + c$

Answer: A

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

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

$$\text{B. } \log \left| \frac{x}{2x+1} \right| - \frac{1}{x} + c$$

$$\text{C. } \log \left| \frac{x}{x+1} \right| - \frac{1}{x} + c$$

$$\text{D. } \log \left| \frac{x}{x-1} \right| + \frac{1}{x} + c$$

Answer: C

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

$$\text{A. } \log \left| \frac{x+1}{x} \right| + \frac{1}{x} + c$$

$$\text{B. } \log \left| \frac{x-1}{x} \right| + \frac{1}{x} + c$$

$$\text{C. } \log \left| \frac{x-1}{x} \right| - \frac{1}{x} + c$$

$$\text{D. } \log \left| \frac{x+1}{x} \right| - \frac{1}{x} + c$$

Answer: D



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

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

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

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

D. none

Answer: B



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$$7. \text{ If } \int \frac{dx}{x - x^3} = A \log \left| \frac{x^2}{1 - x^2} \right| + c \text{ then } A =$$

A. 2

B. 1/2

C. 2/3

D. 1/3

Answer: B

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

A. $\frac{1}{5} \left[\log|x+2| - \frac{1}{2} \log(x^2+1) + 2 \tan^{-1}x \right] + c$

B. $\frac{1}{5} \left[\log|x-2| - \frac{1}{2} \log(x^2+1) - 2 \tan^{-1}x \right] + c$

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

D. none

Answer: B

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$$9. \int \frac{1}{x(x^8 - 1)} dx =$$

A. $\frac{1}{4} \log \left| \frac{x^8 - 1}{x^8} \right| + c$

B. $\frac{1}{8} \log \left| \frac{x^8 - 1}{x^8} \right| + c$

C. $\frac{1}{8} \log \left| \frac{x^8 + 1}{x^8} \right| + c$

D. none

Answer: B

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$$10. \int \frac{1}{(x^2 - 1)(x^2 + 2)} dx =$$

$$\text{A. } \frac{1}{3} \left[\frac{1}{2} \log \left| \frac{x+1}{x-1} \right| - \tan^{-1} \frac{x}{\sqrt{2}} \right] + c$$

$$\text{B. } \frac{1}{3} \left[\frac{1}{2} \log \left| \frac{x-1}{x+1} \right| + \frac{1}{\sqrt{2}} \tan^{-1} \frac{x}{\sqrt{2}} \right] + c$$

$$\text{C. } \frac{1}{3} \left[\frac{1}{2} \log \left| \frac{x-1}{x+1} \right| - \frac{1}{\sqrt{2}} \tan^{-1} \frac{x}{\sqrt{2}} \right] + c$$

$$\text{D. } \frac{1}{3} \left[\frac{1}{3} \log \left| \frac{x-1}{x+1} \right| - \frac{1}{2\sqrt{2}} \tan^{-1} \frac{x}{\sqrt{2}} \right] + c$$

Answer: C



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$$11. \int \frac{1}{(x^2 + a^2)(x^2 + b^2)} dx =$$

$$\text{A. } \frac{1}{b^2 + a^2} \left[\frac{1}{2} \tan^{-1} \frac{x}{a} - \frac{1}{b} \tan^{-1} \frac{x}{b} \right] + c$$

$$\text{B. } \frac{1}{b^2 - a^2} \left[\frac{1}{a} \tan^{-1} \frac{x}{a} + \frac{1}{b} \tan^{-1} \frac{x}{b} \right] + c$$

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

D. none

Answer: B

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12.
$$\int \frac{x^2 - 1}{(x^2 + 1)(x^2 + 2)(x^2 + 3)} dx =$$

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

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

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

D. none

Answer: A

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$$13. \int \frac{1}{a^4 - x^4} dx =$$

$$A. \frac{1}{4a^3} \left[\log \left| \frac{a+x}{a-x} \right| + 2 \tan^{-1} \frac{x}{a} \right] + c$$

$$B. \frac{1}{2a^3} \left[\log \left| \frac{a+x}{a-x} \right| + 2 \tan^{-1} \frac{x}{a} \right] + c$$

$$C. \frac{1}{4a^3} \left[\log \left| \frac{a-x}{a+x} \right| - 2 \tan^{-1} \frac{x}{a} \right] + c$$

D. none

Answer: A

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

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

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

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

D. none

Answer: B

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15. $\int \frac{e^x}{e^{2x} + 2e^x + 5} dx =$

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

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

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

D. none

Answer: B

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$$16. \int \frac{1}{e^x + 2e^{-x} - 3} dx =$$

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

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

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

D. none

Answer: C

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$$17. \int \frac{dx}{x(\log x - 2)(\log x - 3)} = I + c \Rightarrow I =$$

A. $\frac{1}{x} \log \left| \frac{\log x - 3}{\log x - 2} \right|$

$$\text{B. } \log \left| \frac{\log x - 3}{\log x - 2} \right|$$

$$\text{C. } \log \left| \frac{\log x - 2}{\log x - 3} \right|$$

$$\text{D. } \log | (\log(x - 3)(\log x - 2)) |$$

Answer: B

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$$18. \int \frac{\sin x}{\cos x(1 + \cos x)} dx = f(x) + c \Rightarrow f(x) =$$

$$\text{A. } \log \left| \frac{1 + \cos x}{\cos x} \right|$$

$$\text{B. } \log \left| \frac{1 + \cos x}{1 + \cos x} \right|$$

$$\text{C. } \log \left| \frac{\sin x}{1 + \sin x} \right|$$

$$\text{D. } \log \left| \frac{1 + \sin x}{\sin x} \right|$$

Answer: A

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$$19. \int \frac{x^2}{x^6 + 2x^3 + 2} dx =$$

A. $\tan^{-1}(x^3 + 1) + c$

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

C. $\frac{1}{3} \tanh^{-1}(x^3 - 1) + c$

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

Answer: D

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$$20. \int \frac{\cos x}{2\sin^2 x - 3\sin x + 4} dx =$$

A. $\frac{2}{\sqrt{23}} \tan^{-1}\left(\frac{4\sin x - 3}{\sqrt{23}}\right) + c$

B. $\frac{2}{\sqrt{23}} \tan^{-1} \left(\frac{4\sin x + 3}{\sqrt{23}} \right) + c$

C. $\frac{2}{\sqrt{24}} \tan^{-1} \left(\frac{4\sin x - 3}{\sqrt{24}} \right) + c$

D. none

Answer: A

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21. $\int \frac{\cot x}{1 + \sin^2 x} dx =$

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

B. $\log \left| \frac{\cos x}{\sqrt{1 + \sin^2 x}} \right| + c$

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

D. none

Answer: A

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22. $\int \frac{\tan x}{1 + \cos x} dx =$

A. $-\log \left| \frac{\cos x}{1 + \cos x} \right| + c$

B. $\log \left| \frac{1 + \cos x}{\cos x} \right| + c$

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

D. none

Answer: B

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23. $\int \frac{\tan x}{1 + \cos x} dx =$

A. 4

B. 3

C. 2

D. 1

Answer: C



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24. If $\int \frac{x^2 - a^2}{x^2 + a^2} dx = x + k \tan^{-1} \frac{x}{a} + c$ then $k =$

A. $2a^2$

B. a^2

C. $-2a$

D. $2a$

Answer: c



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$$25. \int \frac{dx}{x\sqrt{1-x^3}} =$$

$$A. \frac{1}{3} \log \left[\frac{\sqrt{1-x^3} - 1}{\sqrt{1-x^3} + 1} \right] + c$$

$$B. \frac{2}{3} \log \left[\frac{\sqrt{1-x^3} - 1}{\sqrt{1-x^3} + 1} \right] + c$$

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

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

Answer: A



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$$26. \text{ If } \int \frac{2x^2 + a^2}{x^2(x^2 + a^2)} dx = \frac{k}{x} + \frac{1}{a} \tan^{-1} \frac{x}{a} + c \text{ Then } k =$$

A. 0

B. -1

C. 1

D. $1/a$

Answer: B

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$$27. \int \frac{1}{(e^x - 1)^2} dx =$$

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

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

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

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

Answer: A

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28. Evaluate the integrals.

$$\int \frac{dx}{e^x + e^{2x}}$$

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

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

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

D. none

Answer: B

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$$29. \int \frac{\cos x + x \sin x}{x(x - \cos x)} dx =$$

A. $\log|x(x - \cos x)| + c$

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

C. $\log \left| \frac{x}{x - \cos x} \right| + c$

D. none

Answer: B

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$$30. \int \frac{1}{\sin^2 x + \sin 2x} dx =$$

A. $\log \left| \frac{\tan x}{\tan x + 2} \right| + c$

B. $\frac{1}{2} \log \left| \frac{\tan x}{\tan x + 2} \right| + c$

C. $2 \log \left| \frac{\tan x + 2}{\tan x} \right| + c$

D. none

Answer: B

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31. $\int \frac{\sin x \cos^3 x}{1 + \cos^2 x} dx =$

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

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

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

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

Answer: A

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$$32. \int \frac{1}{\sqrt{9x^2 - 25}} dx =$$

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

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

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

D. none

Answer: B



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$$33. \int \frac{1}{\sqrt{4 - 9x^2}} dx =$$

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

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

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

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

Answer: C

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$$34. \int \frac{1}{\sqrt{x^2 - 4x - 5}} dx =$$

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

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

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

D. none

Answer: C

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

A. $\frac{1}{\sqrt{2}} \sinh^{-1} \left(\frac{4x - 3}{\sqrt{23}} \right) + c$

B. $\frac{1}{\sqrt{2}} \sinh^{-1} \left(\frac{4x + 3}{\sqrt{23}} \right) + c$

C. $\frac{1}{\sqrt{2}} \cosh^{-1} \left(\frac{4x + 3}{\sqrt{23}} \right) + c$

D. none

Answer: B



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

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

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

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

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

Answer: A

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

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

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

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

D. $\sin^{-1}\sqrt{x} + c$

Answer: A

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$$38. \int \frac{1}{\sqrt{5x - 6 - x^2}} dx =$$

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

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

C. $\cosh^{-1}(2x + 5) + c$

D. none

Answer: B

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$$39. \int \frac{2x + 5}{\sqrt{x^2 + 4x - 5}} dx =$$

A. $2\sqrt{x^2 + 4x - 5} - \cosh^{-1}\left(\frac{x + 2}{3}\right) + c$

$$\text{B. } 2\sqrt{x^2 + 4x - 5} + \cosh^{-1}\left(\frac{x+2}{3}\right) + c$$

$$\text{C. } 2\sqrt{x^2 + 4x + 5} + \cos^{-1}\left(\frac{x+2}{3}\right) + c$$

$$\text{D. } 2\sqrt{x^2 + 4x - 5} + \cos^{-1}\left(\frac{x-2}{3}\right) + c$$

Answer: B

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$$40. \int \frac{2x+2}{\sqrt{x^2-4x-5}} dx =$$

$$\text{A. } \sqrt{x^2 - 4x - 5} + \log\left|x + \sqrt{x^2 - 4x - 5}\right| + c$$

$$\text{B. } \log\left|\sqrt{x^2 - 4x - 5}\right| + \sqrt{x^2 - 4x - 5} + c$$

$$\text{C. } \sqrt{x^2 - 4x - 5} + 6\log\left|(x-2) + \sqrt{x^2 - 4x - 5}\right| + c$$

$$\text{D. } 2\sqrt{x^2 - 4x - 5} + 6\log\left|(x-2) + \sqrt{x^2 - 4x - 5}\right| + c$$

Answer: D

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$$41. \int \frac{2x - 1}{\sqrt{1 - 5x - 6x^2}} dx =$$

A. $-\frac{1}{3}\sqrt{1 + 5x + 6x^2} - \frac{11}{6\sqrt{6}}\sin^{-1}\left(\frac{12x - 5}{7}\right) + c$

B. $-\frac{1}{3}\sqrt{1 - 5x - 6x^2} - \frac{11}{6\sqrt{6}}\sin^{-1}\left(\frac{12x - 5}{7}\right) + c$

C. $-\frac{1}{3}\sqrt{1 - 5x - 6x^2} - \frac{11}{6\sqrt{6}}\sin^{-1}\left(\frac{12x + 5}{7}\right) + c$

D. none

Answer: B

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$$42. \int \frac{3x - 4}{\sqrt{2x^2 + 4x + 5}} dx =$$

$$\text{A. } \frac{3}{2}\sqrt{2x^2 + 4x + 5} + \frac{7}{\sqrt{2}}\sinh^{-1}\left(\frac{\sqrt{2}(x+1)}{\sqrt{3}}\right) - c$$

$$\text{B. } \frac{3}{2}\sqrt{2x^2 - 4x - 5} + \frac{7}{\sqrt{2}}\sinh^{-1}\left(\frac{\sqrt{2}(x+1)}{\sqrt{3}}\right) - c$$

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

$$\text{D. } \frac{3}{2}\sqrt{2x^2 + 4x + 5} - \frac{7}{\sqrt{2}}\sinh^{-1}\left(\frac{\sqrt{2}(x+1)}{\sqrt{3}}\right) - c$$

Answer: D

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$$43. \int \frac{e^x}{\sqrt{e^{2x} - 3e^x + 5}} dx =$$

$$\text{A. } \sinh^{-1}\left(\frac{2e^x - 3}{\sqrt{11}}\right) + c$$

$$\text{B. } \sinh^{-1}\left(\frac{e^x - 3}{\sqrt{1}}\right) + c$$

$$\text{C. } \sinh^{-1}\left(\frac{2e^x + 3}{\sqrt{1}}\right) + c$$

D. none

Answer: A

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44. $\int \frac{\sec^2 x}{\sqrt{\tan^2 x - 2 \tan x + 5}} dx =$

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

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

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

D. none

Answer: B

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$$45. \int \frac{x^3}{\sqrt{a^8 - x^8}} dx =$$

$$A. -\frac{1}{4} \sin^{-1} \left(\frac{x^4}{a^4} \right) + c$$

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

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

D. none

Answer: C

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46. Evaluate the integrals.

$$\int \sqrt{\frac{5-x}{x-2}} dx \text{ on } (2, 5)$$

$$A. \sqrt{7x - x^2 - 10} - \frac{3}{2} \sin^{-1} \left(\frac{2x+7}{3} \right) + c$$

$$B. \sqrt{7x + x^2 - 10} - \frac{3}{2} \sin^{-1} \left(\frac{2x - 7}{3} \right) + c$$

$$C. \sqrt{7x - x^2 - 10} + \frac{3}{2} \sin^{-1} \left(\frac{2x - 7}{3} \right) + c$$

$$D. \sqrt{7x - x^2 - 10} + \frac{3}{2} \sin^{-1} \left(\frac{2x + 7}{3} \right) + c$$

Answer: C

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$$47. \int \left[\sqrt{\frac{1+x}{1-x}} \right] dx =$$

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

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

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

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

Answer: D

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48. $\int \left(\sqrt{\frac{2+x}{2-x}} \right) dx =$

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

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

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

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

Answer: D

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49. If $\int \frac{2^x}{\sqrt{1-4^x}} dx = K\sin^{-1}(2^x) + c$, then $K=$

A. $\log 2$

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

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

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

Answer: D

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50. $\int \frac{1}{2x^2 - 3} dx =$

A. $\frac{1}{\sqrt{6}} \log \left| \frac{\sqrt{2x} - \sqrt{3}}{\sqrt{2x + \sqrt{3}}} \right| + c$

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

C. $\frac{1}{2\sqrt{6}} \log \left| \frac{\sqrt{2x} + \sqrt{3}}{\sqrt{2x + \sqrt{3}}} \right| + c$

D. none

Answer: B

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$$51. \int \frac{1}{9x^2 + 16} dx =$$

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

B. $\frac{1}{12} \tan^{-1}\left(\frac{3x}{4}\right) + c$

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

D. none

Answer: B

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$$52. \int \frac{e^{2x}}{\sqrt{e^x + 1}} dx =$$

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

B. $\frac{4}{7}(e^x + 1)^{7/4} + \frac{4}{3}(e^x + 1)^{3/4} + c$

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

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

Answer: D



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53. $\int \frac{1}{x^2 + 6x + 10} dx =$

A. $\tan^{-1}(x + 3) + c$

B. $\tan^{-1}(x - 3) + c$

C. $\sinh^{-1}(x - 3) + c$

D. none

Answer: A



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$$54. \int \frac{dx}{x^2 + 2x + 2} = f(x) + c \Rightarrow f(x) =$$

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

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

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

D. $3\tan^{-1}(x + 1) + c$

Answer: A

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$$55. \int \frac{1}{2x^2 + 3x - 5} dx =$$

A. $\frac{1}{5} \log \left| \frac{2x - 2}{2x + 5} \right| + c$

B. $\frac{1}{7} \log \left| \frac{2x - 2}{2x + 5} \right| + c$

C. $\frac{1}{7} \log \left| \frac{2x-2}{2x-5} \right| + c$

D. none

Answer: B

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56. $\int \frac{1}{6x - 7 - x^2} dx =$

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

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

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

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

Answer: C

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57. $\int \frac{3x + 4}{x^2 + 2x + 3} dx =$

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

B. $\frac{3}{2} \log |x^2 - 2x - 3| + \frac{1}{\sqrt{2}} \tan^{-1} \left(\frac{x+1}{\sqrt{2}} \right) + c$

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

D. none

Answer: A

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58. If $\int \frac{x+5}{x^2+4x+5} dx = a \log(x^2+4x+5) + b \tan^{-1}(x+k)$ constant

then (a,b,k)=

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

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

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

D. $(1, 3, 2)$

Answer: A

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59. Evaluate the integrals.

$$\int \sqrt{e^x - 4} dx \text{ on } [\log_e 4, \infty).$$

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

B. $2\sqrt{e^x - 4} - 4\tan^{-1}\left(\frac{\sqrt{e^x - 4}}{2}\right) + c$

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

$$D. \sqrt{e^x - 4} - 4\tan^{-1}\left(\sqrt{e^x - 4}\right) + c$$

Answer: B

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$$60. \int \frac{x + 4}{6x - 7 - x^2} dx =$$

$$A. \frac{1}{2} \log |6x - 7 - x^2| - \frac{7}{2\sqrt{2}} \log \left| \frac{x + 3 - \sqrt{2}}{x - 3 + \sqrt{2}} \right| + c$$

$$B. -\frac{1}{2} \log |6x + 7 + x^2| + \frac{7}{2\sqrt{2}} \log \left| \frac{x - 3 - \sqrt{2}}{x - 3 + \sqrt{2}} \right| + c$$

$$C. -\frac{1}{2} \log |6x - 7 - x^2| - \frac{7}{2\sqrt{2}} \log \left| \frac{x - 3 - \sqrt{2}}{x - 3 + \sqrt{2}} \right| + c$$

D. none

Answer: C

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$$61. \int \sqrt{x^2 + 4} dx =$$

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

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

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

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

Answer: A



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$$62. \int \sqrt{4 - x^2} dx =$$

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

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

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

D. none

Answer: C



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63. $\int \sqrt{x^2 - 25} dx =$

A. $\frac{x}{2}\sqrt{x^2 - 25} - \frac{25}{2} \cosh^{-1}\left(\frac{x}{5}\right) + c$

B. $\frac{x}{2}\sqrt{x^2 + 25} + \frac{25}{2} \sinh^{-1}\left(\frac{x}{5}\right) + c$

C. $\frac{x}{3}\sqrt{x^2 - 25} + \frac{25}{2} \cosh^{-1}\left(\frac{x}{3}\right) + c$

D. none

Answer: A



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64. $\int \sqrt{1 + x - 2x^2} dx =$

A. $\frac{(4x + 1)}{8} \sqrt{1 + x - 2x^2} + \frac{9}{16\sqrt{2}} \sin^{-1} \left(\frac{4x + 1}{3} \right) + c$

B. $\frac{(4x - 1)}{8} \sqrt{1 + x - 2x^2} + \frac{9}{16\sqrt{2}} \sin^{-1} \left(\frac{4x - 1}{3} \right) + c$

C. $\frac{(4x - 1)}{8} \sqrt{1 + x + 2x^2} - \frac{9}{6\sqrt{2}} \sin^{-1} \left(\frac{4x - 1}{3} \right) + c$

D. none

Answer: B

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65. $\int \sqrt{2x^2 + 3x + 4} dx =$

A. $\frac{(4x - 3)}{8} \sqrt{2x^2 - 3x - 4} + \frac{23}{16\sqrt{2}} \sinh^{-1} \left(\frac{4x + 3}{\sqrt{23}} \right) + c$

B. $\frac{(4x - 3)}{8} \sqrt{2x^2 + 3x + 4} + \frac{23}{6\sqrt{2}} \sinh^{-1} \left(\frac{4x - 3}{\sqrt{23}} \right) + c$

C. $\frac{(4x + 3)}{8} \sqrt{2x^2 + 3x + 4} + \frac{23}{16\sqrt{2}} \sinh^{-1} \left(\frac{4x + 3}{\sqrt{23}} \right) + c$

D.

Answer: C

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66. $\int \frac{1}{x + \sqrt{x^2 + 1}} = dx$

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

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

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

D. none

Answer: A

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67. $\int (3x + 2)\sqrt{x^2 + 2x + 5} dx =$

A. $(x^2 + 2x + 5)^{3/2} - \frac{(x - 1)}{2}\sqrt{x^2 + 2x + 5} - 2\sinh^{-1}\left(\frac{x + 1}{2}\right) + c$

B. $(x^2 + 2x + 5)^{3/2} - \frac{(x - 1)}{2}\sqrt{x^2 + 2x + 5} - 2\sinh^{-1}\left(\frac{x + 1}{2}\right) + c$

C. $(x^2 - 2x + 5)^{3/2} - \frac{(x - 1)}{2}\sqrt{x^2 + 2x + 5} - 2\sinh^{-1}\left(\frac{x + 1}{2}\right) + c$

D. $(x^2 + 2x + 5)^{3/2} - \frac{(x - 1)}{2}\sqrt{x^2 - 2x - 5} - 2\sinh^{-1}\left(\frac{x + 1}{2}\right) + c$

Answer: B

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68. $\int (2 - 3x)\sqrt{x^2 - 4x - 5} dx =$

A. $(x^2 + 4x + 5)^{3/2} + 2(x - 2)\sqrt{x^2 - 4x - 5} - 18\cosh^{-1}\left(\frac{x - 2}{3}\right) + c$

B. $-(x^2 - 4x - 5)^{3/2} - 2(x - 2)\sqrt{x^2 - 4x - 5} + 18\cosh^{-1}\left(\frac{x - 2}{3}\right) + c$

C. $-(x^2 - 4x - 5)^{3/2} + 2(x + 2)\sqrt{x^2 + 4x + 5} + 18\cosh^{-1}\left(\frac{x - 2}{3}\right) + c$

D. none

Answer: B

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69. $\int \frac{dx}{(x - 1)\sqrt{x^2 - 1}} =$

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

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

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

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

Answer: C

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$$70. \int \frac{1}{(x+1)\sqrt{x^2+x+2}} dx =$$

A. $\frac{1}{\sqrt{2}} \cosh^{-1} \left(\frac{3-x}{\sqrt{7}(x+1)} \right) + c$

B. $-\frac{1}{\sqrt{2}} \cosh^{-1} \left(\frac{3-x}{\sqrt{7}(x+1)} \right) + c$

C. $-\frac{1}{\sqrt{2}} \cosh^{-1} \left(\frac{3+x}{\sqrt{7}(x-1)} \right) + c$

D. $-\frac{1}{\sqrt{2}} \cosh^{-1} \left(\frac{3-x}{\sqrt{7}(x-1)} \right) + c$

Answer: B

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$$71. \int \frac{1}{(2x+1)\sqrt{x^2-x-2}} dx =$$

A. $-\frac{1}{\sqrt{5}}\sin^{-1}\left(\frac{4x+7}{6x+3}\right) + c$

B. $-\frac{1}{\sqrt{3}}\sin^{-1}\left(\frac{4x+7}{6x+3}\right) + c$

C. $-\frac{1}{\sqrt{5}}\sin^{-1}\left(\frac{4x-7}{6x-3}\right) + c$

D. none

Answer: A



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72. $\int \frac{1}{x^2\sqrt{1+x^2}} dx =$

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

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

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

D. none

Answer: A

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$$73. \int \frac{1}{(x^2 + 9)\sqrt{x^2 - 9}} dx =$$

$$A. \frac{1}{8\sqrt{2}} \log \left| \frac{\sqrt{2} - x - \sqrt{x^2 - 9}}{\sqrt{2}x - \sqrt{x^2 - 9}} \right| + c$$

$$B. \frac{1}{18\sqrt{2}} \log \left| \frac{\sqrt{2} + x - \sqrt{x^2 - 9}}{\sqrt{2}x - \sqrt{x^2 - 9}} \right| + c$$

$$C. \frac{1}{18\sqrt{2}} \log \left| \frac{\sqrt{2} + x - \sqrt{x^2 + 9}}{\sqrt{2}x - \sqrt{x^2 - 9}} \right| - c$$

D. none

Answer: B

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$$74. \int \frac{1}{(1+x^2)\sqrt{1-x^2}} dx =$$

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

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

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

D. none

Answer: C

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$$75. \int \frac{2x+3}{\sqrt{3-x}} dx =$$

$$A. -18\sqrt{3-x} - \frac{4}{3}(3-x)^{3/2} + c$$

$$B. -18\sqrt{3-x} + \frac{4}{3}(3-x)^{3/2} + c$$

$$C. 18\sqrt{3-x} - \frac{4}{3}(3+x)^{3/2} + c$$

$$D. -18\sqrt{3+x} + \frac{4}{3}(3-x)^{3/2} + c$$

Answer: B

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$$76. \int \frac{2x+3}{\sqrt{4x+3}} dx =$$

$$A. \frac{1}{12}(4x-3)^{3/2} + \frac{1}{4}\sqrt{4x+3} + c$$

$$B. \frac{1}{12}(4x+3)^{3/2} + \frac{3}{4}\sqrt{4x+3} + c$$

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

D. none

Answer: B

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77. Evaluate the following integrals

$$\int (x + 2)\sqrt{x + 1} \, dx$$

A. $\frac{2}{5}(x - 1)^{3/2}(3x + 8) + c$

B. $\frac{2}{15}(x - 1)^{3/2}(3x - 8) + c$

C. $\frac{2}{15}(x + 1)^{3/2}(3x + 8) + c$

D. $\frac{2}{15}(x - 1)^{3/2}(3x + 8) + c$

Answer: C



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78. $\int (2x + 3)\sqrt{2 - 3x} \, dx =$

A. $-\frac{1}{135}(2 - 3x)^{3/2}(36x - 106) + c$

B. $\frac{1}{35}(2 + 3x)^{3/2}(36x - 106) + c$

C. $-\frac{1}{135}(2 + 3x)^{3/2}(36x - 106) + c$

$$D. -\frac{1}{135}(2 - 3x)^{3/2}(36x - 106) + c$$

Answer: D

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79. If $\int \frac{dx}{\sqrt{x}(x+9)} = f(x) + \text{constant}$, then $f(x) =$

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

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

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

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

Answer: B

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

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

B. $\tan^{-1}(\sqrt{x-1}) + c$

C. $2\tanh^{-1}(\sqrt{x+1}) + c$

D. none

Answer: A

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81. $\int \frac{dx}{(x+100)\sqrt{x+99}} = f(x) + c \Rightarrow f(x) =$

A. $2(x+100)^{1/2}$

B. $3(x+100)^{1/2}$

C. $2\tan^{-1}(\sqrt{x+99})$

D. $2\tan^{-1}(\sqrt{x+100})$

Answer: C

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$$82. \int \frac{dx}{(x+1)\sqrt{4x+3}} =$$

A. $\tan^{-1}\sqrt{4x+3} + c$

B. $3\tan^{-1}\sqrt{4x+3} + c$

C. $2\tan^{-1}\sqrt{4x+3} + c$

D. $4\tan^{-1}\sqrt{4x+3} + c$

Answer: C

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$$83. \int \frac{x^2 - 1}{x^4 + 1} dx =$$

$$\text{A. } \frac{1}{2\sqrt{2}} \log \left| \frac{x^2 - \sqrt{2}x + 1}{x^2 + \sqrt{2}x + 1} \right| + c$$

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

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

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

Answer: A

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$$84. \int \frac{x^2}{x^4 + 1} dx =$$

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

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

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

D. none

Answer: C

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$$85. \int \frac{x^2 + 1}{x^4 + x^2 + 1} dx =$$

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

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

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

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

Answer: D



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$$86. \int \frac{1}{x^4 + 1} dx =$$

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

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

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

D. none

Answer: B



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$$87. \int \frac{1}{\sqrt{1 + x^4}} dx =$$

$$\text{A. } \frac{1}{4} \log \left| \frac{x + (1 + x^4)^{1/4}}{x - (1 + x^4)^{1/4}} \right| - \frac{1}{4} \tan^{-1} \frac{(1 + x^4)^{1/4}}{x} + c$$

$$\text{B. } \frac{1}{4} \log \left| \frac{x + (1 + x^4)^{1/4}}{x + (1 + x^4)^{1/4}} \right| + \frac{1}{4} \tan^{-1} \frac{(1 + x^4)^{1/4}}{x} + c$$

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

D. none

Answer: C

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$$88. \int \frac{x^2 + 1}{x^4 + x^2 + 1} dx =$$

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

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

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

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

Answer: A

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$$89. \int \frac{7x^8 + 8x^7}{(1 + x + x^8)^2} dx = f(x) + c \Rightarrow f(x) =$$

$$A. \frac{x^8}{1 + x + x^8}$$

$$B. 28 \log(1 + x + x^8)$$

$$C. \frac{1}{1 + x + x^8}$$

$$D. \frac{-1}{1 + x + x^8}$$

Answer: A

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$$90. \int \frac{\sqrt{x^2 + 1} [\log(x^2 + 1) - 2\log x]}{x^4} dx =$$

$$A. \frac{(x^2 + 1)^{3/2}}{9x^3} \left[2 + 3\log \left(1 + \frac{1}{x^2} \right) \right] + c$$

$$B. \frac{(x^2 + 1)^{3/2}}{9x^3} \left[1 - 2\log \left(1 + \frac{1}{x^2} \right) \right] + c$$

$$C. \frac{(x^2 + 1)^{3/2}}{9x^3} \left[2 - 3\log \left(1 + \frac{1}{x^2} \right) \right] + c$$

$$D. \frac{(x^2 + 1)^{3/2}}{9x^3} \left[2 + 3\log \left(1 - \frac{1}{x^2} \right) \right] + c$$

Answer: C

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$$91. \int \frac{x^2}{\sqrt{a^2 - x^2}} dx =$$

$$\text{A. } \frac{a^2}{2} \sin^{-1} \frac{x}{a} - \frac{x}{2} \sqrt{a^2 - x^2} + c$$

$$\text{B. } \frac{a^2}{2} \sin^{-1} \frac{x}{a} - \frac{x}{4} \sqrt{a^2 - x^2} + c$$

$$\text{C. } \frac{a^2}{2} \sin^{-1} \frac{x}{a} - \frac{x}{2} \sqrt{a^2 - x^2} + c$$

$$\text{D. } \frac{a^2}{2} \sin^{-1} \frac{x}{a} + \frac{x}{2} \sqrt{a^2 - x^2} + c$$

Answer: A

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$$92. \int \frac{1}{(9 - x^2)^{3/2}} dx =$$

$$\text{A. } \frac{1}{3} \frac{x}{\sqrt{9 - x^2}} + c$$

$$\text{B. } \frac{1}{9} \frac{x}{\sqrt{9 - x^2}} + c$$

$$\text{C. } \frac{1}{9} \frac{x}{\sqrt{9 + x^2}} + c$$

D. none

Answer: B

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93. $\int \frac{1}{(4 + x^2)^{5/2}} dx =$

A. $\frac{x}{16\sqrt{4 + x^2}} - \frac{x^2}{48(4 + x^2)^{3/2}} + c$

B. $\frac{x}{16\sqrt{4 + x^2}} - \frac{x^3}{48(4 + x^2)^{3/2}} + c$

C. $\frac{x}{16\sqrt{4 + x^2}} + \frac{x^3}{48(4 + x^2)^{3/2}} + c$

D. $\frac{x}{16\sqrt{4 + x^2}} - \frac{x^3}{48(4 - x^2)^{3/2}} + c$

Answer: A

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

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

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

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

D. none

Answer: C

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

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

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

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

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

Answer: C

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$$96. \int \frac{x^3 + 1}{\sqrt{1-x^2}} dx =$$

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

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

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

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

Answer: D

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$$97. \int \frac{x}{(x^2 + 2x + 2)^2} dx =$$

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

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

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

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

Answer: C



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$$98. \text{ Evaluate: } \int \sqrt{\sec x - 1} dx$$

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

B. $-2\cosh^{-1}\left[\sqrt{2}\cos(x/3)\right] + c$

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

D. none

Answer: C

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99. $\int (\sqrt{\sin x} + \sqrt{\cos x})^{-4} dx =$

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

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

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

D. none

Answer: A



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$$100. \int x^2 \sqrt{x^6 - 1} dx =$$

A. $\frac{x}{6} \sqrt{x^6 - 1} + \frac{1}{6} \cosh^{-1} x^3 + c$

B. $\frac{1}{6} \left(x^3 \sqrt{x^6 - 1} + \frac{1}{6} \cosh^{-1} x^3 \right) + c$

C. $-\frac{1}{6} \cosh^{-1} x^3 + c$

D. $\frac{1}{6} \left(x^3 \sqrt{x^6 - 1} - \cos^{-1} x^3 \right) + c$

Answer: B



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$$101. \int \frac{1}{3 + 4\cos x} dx =$$

A. $\frac{1}{\sqrt{7}} \log \left[\frac{\sqrt{7} - \tan(x/2)}{\sqrt{7} + \tan(x/2)} \right] + c$

$$\text{B. } \log \left[\frac{\sqrt{7} + \tan(x/2)}{\sqrt{7} - \tan(x/2)} \right] + c$$

$$\text{C. } \frac{1}{\sqrt{7}} \log \left[\frac{\sqrt{7} + \tan(x/2)}{\sqrt{7} - \tan(x/2)} \right] + c$$

D. none

Answer: C

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102. Evaluate the integrals.

$$\int \frac{dx}{4 + 5\sin x}$$

$$\text{A. } \frac{1}{3} \log \left| \frac{2\tan x/2 + 1}{\tan x/2 + 2} \right| + c$$

$$\text{B. } \frac{1}{6} \log \left| \frac{2\tan x/2 + 1}{\tan x/2 + 4} \right| + c$$

$$\text{C. } \frac{1}{3} \log \left| \frac{2\tan x/2 - 1}{\tan x/2 - 4} \right| + c$$

$$\text{D. } \frac{1}{3} \log \left| \frac{2\cos x/2 + 1}{\tan x/2 + 4} \right| + c$$

Answer: A

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103. $\int \frac{dx}{4\cos x + 3\sin x}$

A. $\frac{1}{5} \log \left| \frac{1 + 2\tan x/2}{4 - 2\tan x/2} \right| + c$

B. $\frac{2}{5} \log \left| \frac{1 + 2\tan x/2}{4 - 2\tan x/2} \right| + c$

C. $\frac{1}{5} \log \left| \frac{1 - 2\tan x/2}{4 - 2\tan x/2} \right| + c$

D. $\frac{1}{3} \log \left| \frac{1 + 2\tan x/2}{4 - 2\tan x/2} \right| + c$

Answer: A

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104. $\int \frac{1}{2\cos x + 3\sin x + 4} dx =$

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

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

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

D. none

Answer: B

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

A. $\frac{1}{\sqrt{2}} \log \left| \frac{\sqrt{2} - \tan(x/2) - 1}{\sqrt{2} - \tan(x/2) - 1} \right| + c$

B. $\frac{1}{\sqrt{2}} \log \left| \frac{\sqrt{2} - \tan(x/2) - 1}{\sqrt{2} - \tan(x/2) + 1} \right| + c$

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

D. none

Answer: C

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

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

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

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

D. $\frac{1}{\sqrt{2}} \log \left| \cot \left(\frac{x}{2} \right) \right| + c$

Answer: B

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$$107. \int \frac{dx}{\cos x + \sqrt{3}\sin x} =$$

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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$$108. \int \frac{1}{1 + \sin 2x} dx =$$

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

B. $\frac{1}{1 + \tan x} + c$

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

$$D. \frac{1}{1 - \tan x} + c$$

Answer: A

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$$109. \int \frac{1}{2 + \cos 2x} = dx$$

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

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

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

D. none

Answer: B

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$$110. \int \frac{1}{1 + (\sin^2 x)} dx =$$

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

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

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

D. none

Answer: A

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$$111. \int \frac{1}{5 + 4\cos^2 x} dx =$$

A. $\frac{3}{\sqrt{5}} \tan^{-1}\left(\frac{\sqrt{5}}{3} \tan x\right) + c$

B. $\frac{1}{3\sqrt{5}} \tan^{-1}\left(\frac{\sqrt{5}}{3} \cos x\right) + c$

C. $\frac{1}{3\sqrt{5}} \tan^{-1} \left(\frac{\sqrt{5}}{3} \tan x \right) + c$

D. none

Answer: C

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112. $\int \frac{1}{4\cos^2 x + 9\sin^2 x} dx =$

A. $\frac{1}{6} \tan^{-1} \left(\frac{3}{2} \tan x \right) + c$

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

C. $\frac{1}{6} \tan^{-1} \left(\frac{3}{5} \tan x \right) + c$

D. none

Answer: A

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$$113. \int \frac{1}{\sin^2 x + 2\sin x \cos x + 5\cos^2 x} dx =$$

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

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

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

D. none

Answer: B



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$$114. \int \frac{1}{1 + \cos^2 x + 2\cos x \sin x} dx =$$

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

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

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

D. none

Answer: A

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115. $\int \frac{1}{4\sin^2 x + 3\sin x \cos x + 2\cos^2 x} dx =$

A. $\frac{1}{\sqrt{23}} \tan^{-1} \left(\frac{8\tan x + 3}{\sqrt{23}} \right) + c$

B. $\frac{2}{\sqrt{23}} \tan^{-1} \left(\frac{8\tan x + 3}{\sqrt{23}} \right) + c$

C. $\frac{2}{\sqrt{23}} \tan^{-1} \left(\frac{8\tan x - 3}{\sqrt{23}} \right) + c$

D. none

Answer: B

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$$116. \int \frac{dx}{a^2 \sin^2 x + b^2 \cos^2 x} =$$

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

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

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

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

Answer: A

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$$117. \int \frac{3 \cos x + 2 \sin x}{4 \sin x + 5 \cos x} dx =$$

A. $\frac{23x}{41} - \frac{2}{41} \log|4 \sin x + 5 \cos x| + c$

B. $\frac{2x}{41} + \frac{23}{41} \log|4 \sin x + 5 \cos x| + c$

C. $\frac{23x}{41} + \frac{2}{41} \log|4\sin x + 5\cos x| + c$

D. none

Answer: C

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118. $\int \frac{\sin x + 8\cos x}{4\sin x + 6\cos x} = dx$

A. $x + \frac{1}{2} \log(4\sin x + 6\cos x) + C$

B. $2x + \log(2\sin x + 3\cos x) + C$

C. $x + \log(2\sin x + 3\cos x) + C$

D. $\frac{1}{2} \log(4\sin x + 6\cos x) + C$

Answer: A

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

A. $\frac{22}{41} \log|5\cos x + 4\sin x| - \frac{7}{41}x + c$

B. $\frac{22}{41} \log|5\cos x + 4\sin x| + \frac{7}{41}x + c$

C. $\frac{22}{41} \log|5\cos x - 4\sin x| + \frac{7}{41}x + c$

D. none

Answer: B

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

A. $\frac{2}{13} \log|2\cos x + 3\sin x| - \frac{3}{13} + c$

B. $\frac{2}{13} \log|2\cos x - 3\sin x| + \frac{3}{13} + c$

C. $-\frac{2}{13} \log|2\cos x + 3\sin x| + \frac{3}{13} + c$

D. none

Answer: C

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

- A. $\frac{4}{25} \log|3\cos x + 4\sin x| - \frac{1}{25}x + c$
- B. $\frac{4}{35} \log|3\cos x - 4\sin x| + \frac{2}{25}x + c$
- C. $\frac{4}{25} \log|3\cos x - 4\sin x| - \frac{2}{25}x + c$
- D. $\frac{4}{25} \log|3\cos x + 4\sin x| + \frac{3}{25}x + c$

Answer: D

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122. Evaluate the integrals.

$$\int \frac{1}{1 + \tan x} dx$$

A. $\frac{1}{2}\log|\cos x + \sin x| + \frac{1}{2}x + c$

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

C. $\frac{1}{2}\log|\cos x + \tan x| + \frac{1}{2}x + c$

D. none

Answer: A

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

A. $\frac{1}{2}[x + \log|\sin x - \cos x|] + c$

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

C. $\log|\sin x - \cos x| - x + c$

D. none

Answer: A



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$$124. \int \frac{\cos x}{\cos x + \sin x} dx =$$

A. $\frac{1}{2}[x - \log|\cos x + \sin x|] + c$

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

C. $\frac{1}{2}[x + \log|\cos x + \sin x|] + c$

D. $\frac{1}{2}[x + \log|\cos x - \sin x|] + c$

Answer: C



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$$125. \int \frac{\cos x}{\cos x - \sin x} dx =$$

A. $\frac{1}{2}\log|\cos x - \sin x| - \frac{1}{2}x + c$

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

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

D. none

Answer: C



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126. 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: B



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$$127. \int \frac{1}{\sin x + \sec x} dx =$$

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

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

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

D. none

Answer: B

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$$128. \int \frac{dx}{\operatorname{cosec} x + \cos x} =$$

$$A. \frac{1}{\sqrt{3}} \log \left| \frac{\cos x - \sin x - \sqrt{3}}{\cos x - \sin x + \sqrt{3}} \right| - \tan^{-1}(\cos x + \sin x) + c$$

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

$$C. \frac{1}{\sqrt{3}} \log \left| \frac{\cos x - \sin x - \sqrt{3}}{\cos x - \sin x + \sqrt{3}} \right| + \tan^{-1}(\cos x + \sin x) + c$$

$$D. \frac{1}{2\sqrt{3}} \log \left| \frac{\cos x - \sin x - \sqrt{3}}{\cos x - \sin x + \sqrt{3}} \right| + \tan^{-1}(\cos x + \sin x) + c$$

Answer: B

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$$129. \text{ If } \int \frac{(x^2 - 1)}{(x + 1)^2 \sqrt{x(x^2 + x + 1)}} dx = A \tan^{-1} \left(\frac{\sqrt{x^2 + x + 1}}{x} \right) + c \text{ in which } c$$

is a constant then A =

A. 3

B. 2

C. 1

D. 1/2

Answer: B



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130. If $\int \frac{dx}{(1 + \sqrt{x})\sqrt{x-x^2}} = \frac{A\sqrt{x}}{\sqrt{1-x}} + \frac{B}{\sqrt{1-x}} + C$, where C is a real constant then $A + B =$

A. 0

B. 1

C. 2

D. 3

Answer: A



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$$131. \int \frac{1}{\sqrt{\cos^4 x - \cos^2 x \sin^2 x}} dx =$$

A. $\sinh^{-1}(\tan x) + c$

B. $-\sinh^{-1}(\tan x) + c$

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

D. none

Answer: C

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$$132. \int \frac{1}{\sqrt{\operatorname{cosec}^2 x + \cot^2 x}} dx =$$

A. $\tan^{-1}(\cos x) + c$

B. $-\sinh^{-1}(\cos x) + c$

C. $\sinh^{-1}(\cos x) + c$

D. none

Answer: B

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EXERCISE 1C

1. $\int x^2 e^x dx =$

A. $e^x(x^2 - 1) + c$

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

C. $e^x(x^2 - 2x + 2) + c$

D. none

Answer: C

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2. $\int x2^x dx =$

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

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

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

D. none

Answer: A



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3. If $\int x^3 e^{5x} dx = \frac{e^{5x}}{5^4} (f(x)) + c$, then $f(x) =$

A. $e^{5x} \left[\frac{x^3}{5} - \frac{3x^2}{25} + \frac{6x}{125} - \frac{6}{625} \right] + c$

B. $e^{5x} \left[\frac{x^3}{5} - \frac{3x^2}{25} - \frac{6x}{125} - \frac{6}{625} \right] + c$

$$C. e^{5x} \left[\frac{x^3}{5} + \frac{3x^2}{25} + \frac{6x}{125} - \frac{6}{625} \right] + c$$

$$D. e^{5x} \left[\frac{x^3}{5} - \frac{3x^2}{25} + \frac{6x}{125} + \frac{6}{625} \right] + c$$

Answer: A

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4. If $\int x^3 e^{5x} dx - \frac{e^{5x}}{5^4} (f(x)) + 0_3$ then $f(x) =$

$$A. \frac{x^3}{5} - \frac{3x^2}{5^2} + \frac{6x}{5^3} - \frac{6}{5^4}$$

$$B. 5x^3 - 5^2x^2 + 5^3x - 6$$

$$C. 5^2x^3 - 15x^2 + 30x - 6$$

$$D. 5^3x^3 - 75x^2 + 30x - 6$$

Answer: D

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5. $\int x \cos x dx =$

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

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

C. $x \sin x - 2 \cos x + c$

D. none

Answer: B

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6. $\int x^2 \cos^2 x dx =$

A. $\frac{1}{2} \left[\frac{x^3}{3} + \frac{x^2}{2} \sin 2x + \frac{x \cos 2x}{2} + \frac{\sin 2x}{4} \right] + c$

B. $\frac{1}{2} \left[\frac{x^3}{3} + \frac{x^2}{2} \sin 2x + \frac{x \cos 2x}{2} - \frac{\sin 2x}{4} \right] + c$

C. $\frac{1}{2} \left[\frac{x^3}{3} - \frac{x^2}{2} \sin 2x - \frac{x \cos 2x}{2} - \frac{\sin 2x}{4} \right] + c$

D. none

Answer: B

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7. $\int x \cos 2x dx =$

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

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

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

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

Answer: A

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

A. $\frac{1}{2} \left[\frac{x^3}{3} - \frac{x^2}{2} \sin 2x - \frac{x}{2} \cos 2x - \frac{1}{4} \sin 2x \right] + c$

B. $\frac{1}{2} \left[\frac{x^3}{3} - \frac{x^2}{2} \sin 2x + \frac{x}{2} \cos 2x - \frac{1}{4} \sin 2x \right] + c$

C. $\frac{1}{2} \left[\frac{x^3}{3} + \frac{x^2}{2} \sin 2x + \frac{x}{2} \cos 2x + \frac{1}{4} \sin 2x \right] + c$

D. none

Answer: B

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9. $\int x \sinh x dx =$

A. $x \cosh x + \sinh x + c$

B. $-\cosh x + \sinh x + c$

C. $x \cosh x - \sinh x + c$

D. none

Answer: C

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10. $\int \log x dx =$

A. $x(\log x - 1) + c$

B. $x(\log x + 1) + c$

C. $x \log x - 1 + c$

D. $x \log x + 1 + c$

Answer: A

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11. $\int x^2 \log x dx =$

A. $\frac{x^3}{3} \left[\log x - \frac{1}{2} \right] + c$

B. $\frac{x^3}{3} \left[\log x - \frac{1}{3} \right] + c$

C. $\frac{x^3}{3} \left[\log x + \frac{1}{3} \right] + c$

D. none

Answer: B

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12. Evaluate the integrals.

$\int x^n \log x dx$ on $(0, \infty)$, n is a real number and $n \neq -1$.

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

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

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

D. none

Answer: A

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13. $\int \log(x + \sqrt{x^2 - 1}) dx =$

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

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

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

D. none

Answer: B

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14. If $\int \log(a^2 + x^2) dx = h(x) + c$, then $h(x) =$

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

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

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

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

Answer: C

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15. $\int x \sec x \tan x dx =$

A. $x \sec x - \log|\sec x - \tan x| - c$

B. $x \sec x + \log|\sec x - \tan x| - c$

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

D. none

Answer: C

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16. $\int \operatorname{cosec}^2 x dx = ?$

A. $-x \cot x - \log|\sin x| + c$

B. $x \cot x - \log|\sin x| + c$

C. $x \cot x + \log|\sin x| + c$

D. $-x \cot x + \log|\sin x| + c$

Answer: D

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17. $\int \sin^{-1}x dx =$

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

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

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

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

Answer: B

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18. $\int \cos^{-1}x dx$

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

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

C. $x \cos^{-1}x + \sqrt{1-x^2} + c$

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

Answer: A

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19. Evaluate $\int x \sin^{-1}x \, dx$ on $(-1,1)$.

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

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

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

D. $\frac{1}{3} \left[\left(x^2 - \frac{1}{2} \right) \sin^{-1}x + \frac{x}{2} \sqrt{1-x^2} + c \right]$

Answer: C

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20. $\int \cot^{-1}x \, dx =$

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

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

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

D. $x \cot^{-1}x + \frac{1}{2} \log(1 + x^2) + c$

Answer: A

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21. $\int \sec^{-1}x dx =$

A. $x \sec^{-1}x + \cosh^{-1}x + c$

B. $x \sec^{-1}x - \cosh^{-1}x + c$

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

D. none

Answer: B

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22. $\int \tan^{-1}\left(\frac{2x}{1-x^2}\right) dx =$

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

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

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

D. none

Answer: C

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23. $\int \cos^{-1}(2x^2 - 1) dx =$

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

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

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

D. none

Answer: A

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24. $\int \sin^{-1}(3x - 4x^3) dx =$

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

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

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

D. none

Answer: B

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

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

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

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

D. none

Answer: A

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26. $\int \tan \left(\sqrt{\frac{1-x}{1+x}} \right) dx =$

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

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

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

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

Answer: A

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$$27. \int \sin^{-1} \left(\frac{2x}{1+x^2} \right) dx = f(x) - \log(1+x^2) + c \Rightarrow f(x) =$$

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

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

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

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

Answer: A

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28.

If

$$I_1 = \int \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx, I_2 = \int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) dx, I_3 = \int \tan^{-1}\left(\frac{2x}{1-x^2}\right) dx$$

then the value of $I_1 + I_2 - I_3 =$

- A. $2x \tan^{-1} x - \log(1+x^2) + c$
- B. $2 \left[x \tan^{-1} x - \log(1+x^2) \right] + c$
- C. $2x \tan^{-1} x + \log(1+x^2) + c$
- D. 0

Answer: A

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29. $\int \sinh^{-1} x dx =$

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

B. $x \sinh^{-1} x - \sqrt{x^2 - 1} + c$

C. $x \sinh^{-1} x + \sqrt{1 + x^2} + c$

D. none

Answer: A

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30. $\int \cosh^{-1} x dx =$

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

B. $x \cosh^{-1} x - \sqrt{x^2 - 1} + c$

C. $x \cosh^{-1} x + \sqrt{1 + x^2} + c$

D. none

Answer: B

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

A. $x \tan \frac{x}{2} + c$

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

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

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

Answer: A



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32. $\int \left(\frac{x}{2} \sec^2(x) + \tan(x) \right) dx$

A. $\sec \frac{x}{2} + c$

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

C. $x \sec \frac{x}{2} + \tan \frac{x}{2} + c$

D. none

Answer: B

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33. $\int \frac{x - \sin x}{1 + \cos x} dx = \tan\left(\frac{x}{2}\right) + p \log \left| \sec\left(\frac{x}{2}\right) \right| + c \Rightarrow p =$

A. -4

B. 4

C. 2

D. -2

Answer: A

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

A. $2\sqrt{x}\sin\sqrt{x} + 2\cos\sqrt{x} + c$

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

C. $2\sqrt{x}\sin\sqrt{x} - 2\cos\sqrt{x} + c$

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

Answer: A

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35. $\int x^3 \cdot e^{x^2} dx =$

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

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

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

D. none

Answer: B

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

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

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

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

D. $x \tan x + \log |\sec x| \frac{x^2}{2} + c$

Answer: B

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37. $\int \frac{x}{1 + \cos x} dx =$

A. $x \tan \frac{x}{1} + 2 \log \left| \sec \frac{x}{2} \right| + c$

B. $x \tan \frac{x}{2} - 2 \log \left| \sec \frac{x}{2} \right| + c$

C. $x \tan \frac{x}{2} - 2 \log \left| \sec \frac{x}{2} \right| - x + c$

D. none

Answer: B



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38. $\int \sin(\log x) + \cos(\log x) dx =$

A. $x \sin(\log x) + c$

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

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

D. none

Answer: A

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39. $\int \sin(\log x) dx =$

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

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

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

D. $\frac{x}{2}[\sin(\log x) + \tan(\log x)] - c$

Answer: A

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

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

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

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

D. none

Answer: B

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41. $\int \frac{1}{\log x} - \frac{1}{(\log x)^2} dx =$

A. $\frac{2x}{\log x} + c$

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

C. $\frac{x}{\log x} + c$

D. none

Answer: C

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42. $\int e^x(x^2 + 2x + 3)dx =$

A. $e^x(x^2 - 3) + c$

B. $e^x(x^2 + 3) - x + c$

C. $e^x(x^2 + 3) + c$

D. $e^x(x^2 - 3) - x + c$

Answer: C

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43. $\int (x + 1)^2 e^x dx =$

A. $x^2 + c$

B. $x^2 e^x + c$

C. $(x + 1)x^x + c$

D. $(x^2 + 1)e^x + c$

Answer: D



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44. $\int e^x (\cos x - \sin x) dx =$

A. $e^x + \cos x + c$

B. $\sin x + c$

C. $e^x \cos x + c$

D. $\sin x - c$

Answer: C



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45. Evaluate the integrals.

$$\int e^x (\tan x + \sec^2 x) dx$$

$$\text{on } I \subset \mathbb{R} \setminus \left\{ (2n+1)\frac{\pi}{2} : n \in \mathbb{Z} \right\}.$$

A. $e^x \sec x + c$

B. $e^x \tan x \sec x + c$

C. $e^x \tan x + c$

D. none

Answer: C



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46. $\int e^x (\tan x + \tan^2 x) dx =$

A. $e^x(\tan x - 1) + c$

B. $e^x(\tan x - 1)x + c$

C. $e^x(\tan x + 1) + c$

D. none

Answer: A

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47. $\int e^x \operatorname{cosec} x (1 - \cot x) dx =$

A. $-e^x \cot x + c$

B. $e^x \operatorname{cosec} x + c$

C. $-e^x \operatorname{cosec} x + c$

D. $e^x \cos x + c$

Answer: B



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48. $\int e^x(1 - \cot x + \cot^2 x) dx =$

A. $e^x \cot x + c$

B. $-e^x \cot x + c$

C. $e^x \operatorname{cosec} x + c$

D. $e^x \operatorname{cosec} x + c$

Answer: B



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

A. $\tan x + c$

B. $e^x \sec x + c$

C. $e^x \operatorname{cosec} x + c$

D. none

Answer: B



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50. If $\int e^x(1+x) \cdot \sec^2(xe^x) dx = f(x) + \text{constant}$, then $f(x) =$

A. $\cos(xe^x)$

B. $\sin(xe^x)$

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

D. $\tan(xe^x)$

Answer: D

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51. Evaluate the integrals.

$$\int e^x \left(\frac{1 + x \log x}{x} \right) dx \text{ on } (0, \infty).$$

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52. $\int e^x(x + 1)\log x dx =$

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

B. $e^x(x \log x - 1) + c$

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

D. none

Answer: B

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53. $\int \frac{e^x}{x+2} [1 + (x+2)\log(x+2)] dx =$

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

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

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

D. none

Answer: C



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54. Evaluate the integrals.

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

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

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

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

D. none

Answer: A

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55. $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx =$

A. $e^x \tan x/2 + c$

B. $e^x \sec x/2 \tan x/2 + c$

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

D. none

Answer: A

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56. If $\int e^x \left[\frac{\cos x - \sin x}{1 - \cos 2x} \right] dx =$

A. $\frac{-1}{2} e^x \operatorname{cosec} x - x + c$

B. $\frac{1}{2} e^x \operatorname{cosec} x + c$

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

D. none

Answer: B



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57. $\int e^x \left[\frac{\cos x + \sin x}{1 + \cos 2x} \right] dx =$

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

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

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

D. none

Answer: A

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58. If $\int e^x \left[\frac{\cos x - \sin x}{1 - \cos 2x} \right] dx =$

A. $e^x \cot\left(\frac{x}{2}\right)$

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

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

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

Answer: C

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$$59. \int \left(\frac{2 - \sin 2x}{1 - \cos 2x} \right) e^x dx =$$

A. $-e^x \cot x + c$

B. $e^x \cot x + c$

C. $2e^x \cot x + c$

D. $-2e^x \cot x + c$

Answer: A

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$$60. \int e^x \left(\log x + \frac{1}{x^2} \right) dx =$$

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

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

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

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

Answer: B

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$$61. \int \frac{xe^x}{(x+1)^2} = dx$$

$$A. \frac{e^x}{x+1} + c$$

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

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

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

Answer: A

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62. $\int e^x \left(\frac{x+2}{(x+3)^2} \right) dx$

A. $e^x \frac{1}{x+3} - x + c$

B. $e^x \frac{1}{x+3} + c$

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

D. none

Answer: B



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

A. $e^x \cot x + c$

B. $2e^x \sec^2 x + c$

C. $2e^x \sec 2x + c$

D. $e^x \tan x + c$

Answer: D

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

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

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

C. $\log xe^2(1+xe^x) = c$

D. $\log(1+xe^x) + c$

Answer: B

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$$65. \int e^x \left\{ \frac{1-x}{1+x^2} \right\}^2 dx =$$

A. $\frac{e^x}{(1+x^2)^2} + c$

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

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

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

Answer: C

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$$66. \int e^{-x}(\sin x - \cos x) dx =$$

A. $-e^x \sin x + c$

B. $e^x \sin x + c$

C. $-e^x \cos x + c$

D. none

Answer: A

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67. If $\int e^x(2 + \sin 2x)\sec^2 x dx = f(x) + c$ then $f(x) =$

A. $e^x(1 + \cos 2x)\sin x$

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

C. $2e^x \tan x$

D. none

Answer: C

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$$68. \int \frac{e^x(x^2 + 1)}{(1 + x)^2} dx =$$

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

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

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

D. none

Answer: C

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$$69. \int e^x \left(x + \sqrt{1 + x^2} \right) \left(1 + \frac{1}{\sqrt{1 + x^2}} \right) dx =$$

A. $e^x \cosh^{-1} x + c$

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

C. $e \sinh^{-1} + c$

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

Answer: D

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70. $\int e^{ax} [af(x) + f'(x)] dx =$

A. $e^{ax} f(x) + c$

B. $e^{ax} a/f(x) + c$

C. $ae^{ax} f(x) + c$

D. none

Answer: A

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

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

B. $e^x/\sqrt{x} + c$

C. $2e^x\sqrt{x} + c$

D. none

Answer: C



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72. $\int |x|dx =$

A. $\frac{x^2}{2} + c$

B. $\frac{x|x|}{2} + c$

C. $x^2 + c$

D. $\frac{|x|^2}{2} + c$

Answer: B



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73. $\int \frac{3 - x^2}{1 - 2x + x^2} e^x dx = e^x f(x) + c \Rightarrow f(x) =$

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

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

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

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

Answer: A



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74. Evaluate the integrals.

$$\int e^x \cos x dx \text{ on } \mathbb{R}.$$

$$\text{A. } \frac{1}{4}e^x \left[\frac{3}{2}(\cos x + \sin x) + \frac{1}{10}(\cos 3x + 3\sin 3x) \right] + c$$

$$\text{B. } \frac{1}{4}e^x \left[\frac{3}{2}(\cos x + \sin x) - \frac{1}{10}(\cos 3x - 3\sin 3x) \right] + c$$

$$\text{C. } \frac{1}{4}e^x \left[\frac{3}{2}(\cos x + \sin x) - \frac{1}{10}(\cos 3x + 3\sin 3x) \right] + c$$

$$\text{D. } \frac{1}{4}e^x \left[\frac{3}{2}(\cos x - \sin x) + \frac{1}{10}(\cos 3x - 3\sin 3x) \right] + c$$

Answer: A

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75. $\int e^{5x} \sin 6x dx =$

$$\text{A. } \frac{e^{5x}}{61} (5\sin 6x - 6\cos 6x) + c$$

$$\text{B. } \frac{e^{5x}}{61} (5\sin 6x + 6\cos 6x) + c$$

$$\text{C. } \frac{e^{5x}}{61} (5\sin 6x - 2\cos 6x) + c$$

$$\text{D. } \frac{e^{5x}}{61} (5\sin 6x + 2\cos 6x) + c$$

Answer: A

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76. Evaluate the integrals.

$$\int e^{ax} \sin bx dx \text{ on } \mathbb{R}, a, b, \in \mathbb{R}.$$

A. $\frac{e^{ax}}{a^2 - b^2} (a \sin bx - b \cos bx) + c$

B. $\frac{e^{ax}}{a^2 - b^2} (a \sin bx - b \cos bx) + c$

C. $\frac{e^{ax}}{a^2 - b^2} (a \sin bx + b \cos bx) + c$

D. $\frac{e^{ax}}{a^2 - b^2} (b \sin bx + a \cos bx) + c$

Answer: B

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77. Evaluate the following integrals

$$\int e^x \sin 3x \cos 3x dx$$

A. $\frac{1}{2}e^x \left[\frac{1}{26}(\sin 5x + 5\cos 5x) + \frac{1}{2}(\sin x - \cos x) \right] + c$

B. $\frac{1}{2}e^x \left[\frac{1}{26}(\sin 5x - 5\cos 5x) + \frac{1}{2}(\sin x + \cos x) \right] + c$

C. $\frac{1}{2}e^x \left[\frac{1}{26}(\sin 5x - 5\cos 5x) + \frac{1}{2}(\sin x - \cos x) \right] + c$

D. $\frac{1}{2}e^x \left[\frac{1}{26}(\sin 5x - 5\cos 5x) - \frac{1}{2}(\sin x - \cos x) \right] + c$

Answer: C

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

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

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

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

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

Answer: A

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79. $\int \frac{\log x - 1}{(\log x)^2} dx =$

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

B. $\frac{\log x}{x} + c$

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

D. $-\frac{1}{\log x} + c$

Answer: A

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$$80. \int \left\{ \frac{(\log x - 1)}{(1 + (\log x)^2)} \right\}^2 dx =$$

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

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

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

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

Answer: D



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$$81. \int \frac{x - \frac{1}{2} \sin 2x}{\sin^2 x} dx =$$

A. $-\cot x + c$

B. $x \cot x + c$

C. $-x \cot x + c$

D. $x \tan x + c$

Answer: A

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82. $\int e^{-x} \tan^{-1}(e^x) dx = f(x) - \frac{1}{2} \log(1 + e^{2x}) + c \Rightarrow f(x) =$

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

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

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

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

Answer: D

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83. If $\int f(x)dx = \Psi(x)$, then $\int x^5 f(x^3) dx$ is equal to :

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

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

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

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

Answer: A



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84. If $I_n = \int (\log x)^n dx$ then $I_n + nI_{n-1} =$

A. $x(\log x)^{n-1}$

B. $x(\log x)^n$

C. $nx(\log x)^n$

D. none

Answer: B



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85. $\int (\log x)^4 dx =$

A. $x \left[(\log x)^4 - 4(\log x)^3 + 12(\log x)^2 - 24\log x - 24 \right] + c$

B. $x \left[(\log x)^4 + 4(\log x)^3 + 12(\log x)^2 + 24\log x + 24 \right] + c$

C. $x \left[(\log x)^4 - 4(\log x)^3 - 12(\log x)^2 - 24\log x - 24 \right] + c$

D. $x \left[(\log x)^4 - 4(\log x)^3 + 12(\log x)^2 - 24\log x + 24 \right] + c$

Answer: D



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86. $\int (\log x)^5 dx =$

A. $x \left[\log^5 x - 5\log^4 x + 20\log^3 x - 60\log^2 x - 120\log x - 120 \right] + c$

B. $x \left[\log^5 x - 5\log^4 x + 20\log^3 x - 60\log^2 x + 120\log x - 120 \right] + c$

C. $x \left[\log^5 x + 5\log^4 x - 20\log^3 x + 60\log^2 x + 120\log x - 120 \right] + c$

D. $x \left[\log^5 x - 5\log^4 x + 20\log^3 x - 60\log^2 x - 120\log x - 120 \right] - c$

Answer: B

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87. For $x > 0$, if

$$\int (\log x)^5 dx = x \left(A(\log x)^5 + B(\log x)^4 + C(\log x)^3 + D(\log x)^2 + E(\log x) + F \right) +$$

constant then $A + B + C + D + E + F =$

A. -44

B. -42

C. -40

D. -36

Answer: A



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88. If $f_n(x) = \log \log \log \dots \log x$ (log is repeated n times), then

$$\int \left[\left(x f_1(x) f_2(x) \dots f_n(x) \right)^{-1} \right] dx =$$

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

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

C. $n f_n(x) + c$

D. $\frac{f_n(x)}{n} + c$

Answer: A



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89. If $I_n = \int x^n \cdot e^{cx} dx$ for $n \leq 1$ then $c \cdot I_n + n \cdot I_{n-1} = c$

A. $x^n e^{cx}$

B. x^n

C. e^{cx}

D. $x^n + e^{cx}$

Answer: A



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90. If $I_n = \int \sin^n x dx$, then $nI_n - (n - 1)I_{n-2} =$

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

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

C. $-\sin^{n-1} x \cos x$

D. $-\cos^{n-1} x \cos x$

Answer: C

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91. $\int \sin^5 x, dx =$

A. $\frac{-\sin^4 x \cos x}{5} - \frac{4}{15} \sin^2 \cos x + \frac{8}{15} \cos x + c$

B. $\frac{-\sin^4 x \cos x}{5} - \frac{4}{15} \sin^2 \cos x - \frac{8}{15} \cos x + c$

C. $\frac{-\sin^4 x \cos x}{5} + \frac{4}{15} \sin^2 \cos x + \frac{8}{15} \cos x + c$

D. none

Answer: B

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92. $\int \cos^4 x dx =$

A. $\frac{\cos^2 x - \sin x}{4} - \frac{3}{8} \cos x \sin x - \frac{3}{8} x + c$

B. $\frac{\cos^2 x - \sin x}{4} + \frac{3}{8} \cos x \sin x - \frac{3}{8} x + c$

$$C. \frac{\cos^2 x - \sin x}{4} + \frac{3}{8} \cos x \sin x + \frac{3}{7} x + c$$

$$D. \frac{\cos^2 x - \sin x}{4} + \frac{3}{8} \cos x \sin x + \frac{3}{8} x + c$$

Answer: D

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93. $\int \cos^5 x dx =$

$$A. \frac{\cos^4 x \sin x}{3} - \frac{4}{15} \cos^2 x \sin x - \frac{8}{15} \sin x + c$$

$$B. \frac{\cos^4 x \sin x}{3} + \frac{4}{15} \cos^2 x \sin x - \frac{8}{15} \sin x + c$$

$$C. \frac{\cos^4 x \sin x}{3} - \frac{4}{15} \cos^2 x \sin x - \frac{8}{15} \sin x + c$$

D. none

Answer: A

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94. $\int \cos^6 x dx =$

A. $\frac{1}{6} \cos^2 x \sin x - \frac{5}{24} \cos^3 x \sin x - \frac{15}{48} x + \frac{15}{48} x + c$

B. $\frac{1}{6} \cos^2 x \sin x + \frac{5}{24} \cos^3 x \sin x - \frac{15}{48} x + \frac{15}{48} x + c$

C. $\frac{1}{6} \cos^2 x \sin x + \frac{5}{24} \cos^3 x \sin x + \frac{15}{48} x + \frac{15}{48} x + c$

D. none

Answer: C



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95. If $I_{m,n} = \int x^m (\log x)^n dx$ then $I_{m,n} =$

A. $\frac{x^{m+1}}{m+1} (\log x)^n - \frac{n}{n+1} I_{m,n-1}$

B. $\frac{x^{m+1}}{m+1} (\log x)^n + \frac{n}{n+1} I_{m,n-1}$

C. $\frac{x^{m+1}}{m+1} (\log x)^n - \frac{n}{n-1} I_{m,n-1}$

D. none

Answer: A

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96. If $I_n = \int (e^{ax}) \frac{dx}{x^n}$, then $I_n =$

A. $\frac{e^x}{(n-1)x^{n-1}} + \frac{a}{n-1} I_{n-1}$

B. $\frac{-e^{ax}}{(n-1)x^{n-1}} + \frac{a}{n-1} I_{n-1}$

C. $\frac{-e^x}{(n-1)x^{n-1}} - \frac{a}{n-1} I_{n-1}$

D. $\frac{-e^{ax}}{(n-1)x^{n-1}} + \frac{a}{n+1} I_{n+1}$

Answer: B

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97. If $I_n = \int \frac{\sin nx}{\sin x} dx$ where $n > 1$, then $I_n - I_{n-2}$

A. $\frac{2}{n-1} \cos(n-1)x$

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

C. $\frac{2}{3} \cos nx$

D. $\frac{2}{3} \sin nx$

Answer: B

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98. If $I_n = \int \frac{\sin nx}{\cos x} dx$, then $I_n =$

A. $\frac{-2}{n-1} \cos(n-1)x - I_{n-2}$

B. $\frac{-2}{n+1} \cos(n-1)x - I_{n-2}$

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

D. none

Answer: A



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99. If $I_n = \int \frac{\cos nx}{\cos x} dx$, then $I_n =$

A. $\frac{2}{n+1} \sin(n-1)x - I_{n-2}$

B. $\frac{2}{n-1} \sin(n+1)x - I_{n-2}$

C. $\frac{2}{n-1} \sin(n-1)x - I_{n-2}$

D. $\frac{3}{n-1} \sin(n+1)x + I_{n-2}$

Answer: C



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100. If $I_n = \int \frac{t^n}{1+t^2} dt$, then $I_{n-2} =$

A. $\frac{t^{n+1}}{n+1} + I_n$

B. $\frac{t^{n+1}}{n+1} - I_n$

$$C. \frac{t^{n+1}}{n-1} - I_n$$

$$D. \frac{t^{n+1}}{2n+1} - I_n$$

Answer: B

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101. For any integer $n \leq 2$ let $I_n = \int x dx$. If $I_n = \frac{1}{a} \tan^{n-1} x - b \ln_{a-2}$ for $n \geq 2$, then ordered pair (a,b) =

A. $\left(n-1, \frac{n-2}{n+1} \right)$

B. $(n, 1)$

C. $(n-1, 1)$

D. $\left(n-1, \frac{n-1}{n-2} \right)$

Answer: C

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102. $\int \tan^5 \theta d\theta =$

A. $\frac{1}{4} \tan^4 \theta - \frac{1}{2} \tan^2 \theta + \log|\sec \theta| + c$

B. $\frac{1}{4} \tan^4 \theta + \frac{1}{2} \tan^2 \theta + \log|\sec \theta| + c$

C. $\frac{1}{4} \tan^4 \theta - \frac{1}{2} \tan^2 \theta - \log|\sec \theta| + c$

D. none

Answer: A

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103. $\int \tan^6 x dx =$

A. $\frac{\tan^5 x}{5} - \frac{\tan^3 x}{3} + \tan x + x + c$

B. $\frac{\tan^5 x}{5} - \frac{\tan^3 x}{3} + \tan x - x + c$

C. $\frac{\tan^5 x}{5} - \frac{\tan^3 x}{3} - \tan x - x + c$

D. none

Answer: B

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104. Obtain reduction formula for $I_n = \int \cot^n x dx$, n being a positive integer, $n \geq 2$ and deduce the value of $\int \cot^4 x dx$.

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

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

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

D. $\frac{1}{3} \cot^3 x - \cot x - x - c$

Answer: A

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105. $\int \cot^7 x dx =$

A. $-\frac{\cot^6 x}{6} + \frac{\cot^4 x}{4} - \frac{\cot^2 x}{2} - \log|\sin x| + c$

B. $\frac{\cot^6 x}{6} + \frac{\cot^4 x}{4} - \frac{\cot^2 x}{2} - \log|\sin x| + c$

C. $-\frac{\cot^6 x}{6} - \frac{\cot^4 x}{4} - \frac{\cot^2 x}{2} - \log|\sin x| + c$

D. none

Answer: A



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106. $\int \sec^4 x dx =$

A. $\frac{1}{3} \sec^2 x \tan x + \frac{2}{3} \ln|\sec x + \tan x| + c$

B. $\frac{1}{3} \sec^2 x \tan x - \frac{2}{3} \tan x - c$

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

D. none

Answer: C



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107. $\int \sec^5 x dx.$

A. $\frac{1}{4}\sec^3 \tan x - \frac{3}{8}\sec x \tan x + \frac{3}{8}\log|\sec x \tan x| + c$

B. $\frac{1}{4}\sec^3 \tan x + \frac{3}{8}\sec x \tan x + \frac{3}{8}\log|\sec x \tan x| + c$

C. $\frac{1}{4}\sec^3 \tan x + \frac{5}{8}\sec x \tan x + \frac{1}{8}\log|\sec x \tan x| + c$

D. none

Answer: B



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108. Obtain reduction formula for

$I_n = \int \operatorname{cosec}^n x dx$, n being a positive integer, $n \geq 2$ and deduce the value

of $\int \operatorname{cosec}^5 x dx$.

A. $-\frac{\operatorname{cosec}^3 x \cot x}{4} - \frac{3 \operatorname{cosec} x \cot x}{8} + \frac{3}{8} \log |\operatorname{cosec} x - \cot x| + c$

B. $\frac{\operatorname{cosec}^3 x \cot x}{4} + \frac{3 \operatorname{cosec} x \cot x}{8} - \frac{3}{8} \log |\operatorname{cosec} x - \cot x| + c$

C. $-\frac{\operatorname{cosec}^3 x \cot x}{4} - \frac{2 \operatorname{cosec} x \cot x}{8} + \frac{3}{8} \log |\operatorname{cosec} x - \cot x| + c$

D. $-\frac{\operatorname{cosec}^3 x \cot x}{4} + \frac{2 \operatorname{cosec} x \cot x}{8} - \frac{3}{8} \log |\operatorname{cosec} x - \cot x| + c$

Answer: A

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109. $\int \operatorname{cosec}^6 x dx =$

A. $\frac{1}{5} \operatorname{cosec}^4 x \cot x - \frac{4}{15} \operatorname{cosec}^2 x \cot x - \frac{8}{15} \cot x + c$

B. $-\frac{1}{5} \operatorname{cosec}^4 x \cot x - \frac{4}{15} \operatorname{cosec}^2 x \cot x - \frac{8}{15} \cot x + c$

C. $\frac{1}{5} \operatorname{cosec}^4 x \cot x + \frac{4}{15} \operatorname{cosec}^2 x \cot x + \frac{8}{15} \cot x + c$

D. none

Answer: B



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EXERCISE 2 (SET-1)

$$1. I: \int \frac{1-x^4}{1-x} dx = x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + c$$

$$II: \int 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots dx = e^x + c$$

- A. only I is true
- B. only II is true
- C. both I and II are true
- D. neither I nor II true

Answer: 3



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$$2. I: \int \frac{1}{\cos x \sin^2 x} dx = \log \left| \frac{\tan(x)}{2} \right| + \sec x + c$$

$$II \int \frac{1}{\cos x + \sin^2 x} dx = \operatorname{cosec} x + \log |\sec x + \tan x| + c$$

- A. only I is true
- B. only II is true
- C. both I and II are true
- D. neither I nor II true

Answer: 1

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$$3. I: \int \frac{(1+x)e^x}{\sin^2(xe^x)} dx = \cot(xe^x) + c$$

$$II: \int \frac{\sec x}{(\sec x + \tan x)^2} dx = \frac{1}{2(\sec x + \tan x)^2} + c$$

- A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: 4

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4. I : $\int \frac{dx}{\sqrt{x}(x+9)} = f(x) + c$ constnat, then $f(x) = \frac{2}{3} \tan^{-1}\left(\frac{\sqrt{x}}{3}\right)$

II : $\int \frac{dx}{(x+100)\sqrt{x+99}} = f(x) + c \Rightarrow f(x) = 2 \tan^{-1} \sqrt{x+99}$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: 3



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EXERCISE 2 (SET-2)

1. If $\int \tan^4 x dx = A \tan^3 x + B \tan x + Cx + c$ then the descending order of A,B,C is

A. A,B,C

B. B,C,A

C. C,A,B

D. C,B,A

Answer: 3



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2. If $\int \frac{x^3 + 1}{x^2 + 1} dx = Ax^2 + B \tan^{-1}x + C \log(x^2 + 1) + c$ then the ascending order of A,B,C is

A. A,B,C

B. B,C,A

C. C,A,B

D. C,B,A

Answer: 3



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

then the ascending order of A,B,C is

A. A,B,C

B. B,A,C

C. C,A,B

D. C,B,A

Answer: 2



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4. If $\int x^2 e^{2x} dx = e^x (Ax^2 + Bx + C) + c$ then the ascending order of A,B,C

is

A. A,B,C

B. B,C,A

C. C,A,B

D. C,B,A

Answer: 2



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EXERCISE 2 (SET-3)

1. Match the following.

I. $\int \sec^2 x \operatorname{cosec}^2 x dx = a) x + c$

II. $\int \tan^2 x \cot^2 x dx = b) \tan x - x + c$

III. $\int \sin^2 x \sec^2 x dx = c) -\cot x - x + c$

IV. $\int \cos^2 x \operatorname{cosec}^2 x dx = d) \tan x - \cot x + c$

A. a,b,c,d

B. b,c,a,d

C. d,a,b,c

D. a,b,c,a

Answer: 3



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2. Match the following.

$$\text{I. } \int \frac{\sin x}{1 + \cos 2x} dx = a) \tan x - \frac{1}{2}x + c$$

$$\text{II } \int \frac{1}{1 - \cos 2x} dx = b) -\cot x - \frac{1}{2}x + c$$

$$\text{III. } \int \frac{1 + \cos^2 x}{1 - \cos 2x} dx = c) \frac{1}{2} \sec x + c$$

$$\text{IV. } \int \frac{1 + \sin^2 x}{1 + \cos 2x} dx = -d) \frac{1}{2} \cot x + c$$

A. a,b,c,d

B. b,c,a,d

C. d,a,b,c

D. a,b,c,a

Answer: 4



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3. Match the following.

$$\text{i. } \int \frac{1}{\sqrt{4-x^2}} dx = a \left) \frac{1}{2} \sinh^{-1} \left(\frac{x}{2} \right) + c$$

$$\text{ii. } \int \frac{1}{\sqrt{4+x^2}} dx = b \left) \frac{\cosh^{-1}(x)}{2} + c$$

$$\text{iii. } \int \frac{1}{x^2-4} dx = c \left) \sin^{-1} \frac{x}{2} + c$$

A. a,b,c

B. b,c,a

C. c,a,b

D. a,c,b

Answer: 3



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4. Match the following.

$$\text{i. } \int \frac{1}{9+x^2} dx = a) \frac{1}{6} \log \left| \frac{3+x}{3-x} \right| + c$$

$$\text{ii. } \int \frac{1}{x^2-9} dx = b) \frac{1}{6} \log \left| \frac{3-x}{3+x} \right| + c$$

$$\text{iii. } \int \frac{1}{9-x^2} dx = c) \frac{1}{3} \tan^{-1} \frac{x}{3} + c$$

A. a,b,c

B. b,c,a

C. c,a,b

D. a,c,b

Answer: 3



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$$1. A: \int \frac{1}{3 + 2\cos x} dx = \frac{2}{\sqrt{5}} \tan^{-1} \left(\frac{1}{\sqrt{5}} \tan \frac{x}{2} \right) + c$$

$$R: \text{ If } a > b \text{ then } \int \frac{dx}{a + b\cos x} = \frac{2}{\sqrt{a^2 - b^2}} \tan^{-1} \left[\frac{\sqrt{a - b}}{a + b} \tan \frac{x}{2} \right] + c$$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: 1

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$$2. A: \int \frac{1}{5 + 4\sin x} dx = \frac{2}{3} \tan^{-1} \left(\frac{4 + 5\tan(x/2)}{3} \right) + c$$

$$R: \text{ If } a > 0, a > b, \text{ then } \int \frac{dx}{a + b\sin x} = \frac{2}{\sqrt{a^2 - b^2}} \tan^{-1} \left[\frac{b + a\tan(x/2)}{\sqrt{a^2 - b^2}} \right] + c$$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: 1

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$$3. A: \int e^x \left(\frac{1 + x \log x}{x} \right) dx = e^x \log x + c$$

$$R: \int e^x [f(x) + f'(x)] dx = e^x f(x) + c$$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: 1



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4. Observe the following statements :

$$A: \int \frac{x^2 - 1}{x^2} e^{\frac{x^2+1}{x}} dx = e^{\frac{x^2+1}{x}} + c$$

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

Then which of the following is true ?

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true but R is not correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

Answer: 3



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