



MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

INDEFINITE INTEGRAL

Solved Examples

1. Evaluate :

$$(i) \int x^9 dx, (ii) \int 3\sqrt{x} dx, (iii) \int dx$$

$$(iv) \int \frac{1}{x^2} dx, (v) \int \frac{1}{x^{1/3}} dx, (vi) \int 5^x dx$$



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2. Evaluate :

(i) $\int 3x^2 dx$, (ii) $\int 2^{(x+3)} dx$



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3. Evaluate:

(i) $\int \left(5x^2 + 2x^{-5} - 7x + \frac{1}{\sqrt{x}} + \frac{5}{x} \right) dx$

(ii) $\int (3 \sin x - 4 \cos x + 5 \sec^2 x - 2 \operatorname{cosec}^2 x) dx$

(iii) $\int (1 - x)(2 + 3x)(5 - 4x) dx$

$$(iv) \int \left(\frac{3x^4 - 5x^3 + 4x^2 - x + 2}{x^3} \right) dx, \quad (v)$$

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



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4. Evaluate: (i) $\int \frac{(x^3 + 4x^2 - 3x - 2)}{(x + 2)} dx$, (ii)

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



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5. Evaluate : (i) $\int \tan^2 x dx$, (ii) $\int \cot^2 x dx$, (iii)

$$\int \sin^2 x dx$$

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6. Evaluate : $\int \sqrt{1 - \sin 2x} dx.$

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

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8. Evaluate $\int \frac{\sec x}{(\sec x + \tan x)} dx.$

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9. Evaluate :

$$(i) \int \left(\frac{4 - 5 \cos x}{\sin^2 x} \right) dx, (ii) \int \left(\frac{1 - \cos 2x}{1 + \cos 2x} \right) dx$$

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



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10. Evaluate $\int \left(\frac{\cos x - 2 \cos 2\alpha}{\cos x - \cos \alpha} \right) dx.$



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



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12. Evaluate : $\int \sin^{-1}(\cos x) dx$.



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13.

Evaluate

$\int \tan^{-1}(\sec x + \tan x) dx, -\pi/2 < x < \pi/2$



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14. $\int \frac{(1 + \sin x)}{(1 - \sin x)} dx = ?$



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15. Evaluate : $\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx$



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Exercise 12

1. Evaluate :

(i) $\int x^7 dx$, (ii) $\int x^{-7} dx$, (iii) $\int x^{-1} dx$

(iv) $\int x^{5/3} dx$, (v) $\int x^{-5/4} dx$, (vi) $\int 2^x dx$

(vii) $\int 3\sqrt{x^2} dx$, (viii) $\int \frac{1}{4\sqrt{x^3}} dx$, (ix) $\int \frac{2}{x^2} dx$



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$$2. (i) \int \left(6x^5 - \frac{2}{x^4} - 7x + \frac{3}{x} - 5 + 4e^x + 7^x \right) dx$$

$$(ii) \int \left(8 - x + 2x^3 - \frac{6}{x^3} + 2x^{-5} + 5x^{-1} \right) dx ,$$

$$(iii) \int \left(\frac{x}{a} + \frac{a}{x} + x^a + a^x + ax \right) dx$$



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$$3. (i) \int (2x - 5x)(3 + 2x)(1 - x) dx, \quad (ii)$$

$$\int \sqrt{x}(ax^2 + bx + c) dx$$

$$(iii) \int \left(\sqrt{x} - 3\sqrt{x^4} + \frac{7}{3\sqrt{x^2}} - 6e^x + 1 \right) dx$$



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4. (i) $\int \left(x^2 - \frac{1}{x^2} \right)^3 dx$, (ii) $\int \left(\sqrt{x} - \frac{1}{\sqrt{x}} \right) dx$
(iii) $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}} \right)^2 dx$, (iv) $\int \frac{(1 + 2x)^3}{x^4} dx$
(v) $\int \frac{(1 + x)^3}{\sqrt{x}} dx$, (vi) $\int \frac{2x^2 + x - 2}{(x - 2)} dx$

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5.

$$\int \left[1 + \frac{1}{(1 + x^2)} - \frac{2}{\sqrt{1 - x^2}} + \frac{5}{x\sqrt{x^2 - 1}} + a^x \right] dx$$

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6. (i) $\int \left(\frac{x^2 - 1}{x^2 + 1} \right) dx$, (ii) $\int \left(\frac{x^6 - 1}{x^2 + 1} \right) dx$
(iii) $\int \left(\frac{x^4}{1 + x^2} \right) dx$, (iv) $\int \left(\frac{x^2}{1 + x^2} \right) dx$



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7.

$$\int \left(9 \sin x - 7 \cos x - \frac{6}{\cos^2 x} + \frac{2}{\sin^2 x} + \cot^2 x \right) dx$$



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



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9. (i) $\int \sec x (\sec x + \tan x) dx$

(ii) $\int \cos ecx (\cos ecx + \cot x) dx$



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10. (i) $\int (\tan x + \cot x)^2 dx$, (ii) $\int \left(\frac{1 + 2 \sin x}{\cos^2 x} \right) dx$
, (iii) $\int \left(\frac{3 \cos x + 4}{\sin^2 x} \right) dx$



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11. (i) $\int \frac{\tan x}{(\sec x + \tan x)} dx$, (ii) $\int \frac{1}{(1 - \sin x)} dx$



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12. (i) $\int \frac{\tan x}{(\sec x + \tan x)} dx$, (ii)
 $\int \frac{\operatorname{cosec} x}{(\operatorname{cosec} x - \cot x)} dx$



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13. (i) $\int \frac{\cos x}{1 + \cos x} dx$, (ii) $\int \frac{\sin x}{(1 - \sin x)} dx$



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14. (i) $\int \sqrt{1 + \cos 2x} dx$, (ii) $\int \sqrt{1 - \cos 2x} dx$



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15. (i) $\int \frac{1}{(1 + \cos 2x)} dx$, (ii) $\int \frac{1}{(1 - \cos 2x)} dx$



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16. $\int \sqrt{1 + \sin 2x} dx$



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17. $\int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cdot \cos^2 x} dx$



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



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



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20. $\int \cos^{-1}(\sin x) dx$



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21. Evaluate: $\int \tan^{-1} \left\{ \sqrt{\frac{1-\sin x}{1+\sin x}} \right\} dx, \left[-\frac{\pi}{2}, \frac{\pi}{2} \right]$



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22. $\int (3 \cot x - 2 \tan x)^2 dx$



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$$23. \int (3 \sin x + 4 \cos ecx)^2 dx$$



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$$24. \int \frac{dx}{\sqrt{x+1} + \sqrt{x+2}}$$



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$$25. \int \frac{1}{\sqrt{x+3} - \sqrt{x+2}} dx$$



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$$26. \int \left(\frac{1 + \cos x}{1 - \cos x} \right) dx$$



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$$27. \int \left(\frac{1 + \tan x}{1 - \tan x} \right) dx$$



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$$28. \int \frac{\cos(x + a)}{\sin(x + b)} dx$$



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29. $\int \frac{\sin(x - \alpha)}{\sin(x + \alpha)} dx$



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30. $\int (1 - x) \sqrt{x} dx$



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31. $\int \frac{\sec^2 x}{\cos e c^2 x} dx$



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$$32. \int \left\{ \frac{2 - 3 \sin x}{\cos^2 x} \right\} dx$$



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Objective Questions

1. $\int x^6 dx = ?$

A. $7x^7 + C$

B. $\frac{x^7}{7} + C$

C. $6x^5 + C$

D. $6x^7 + C$

Answer: B



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

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

B. $\frac{8}{3}x^{\frac{8}{3}} + C$

C. $\frac{3}{8}x^{\frac{8}{3}} + C$

D. $\frac{5}{3}x^{\frac{8}{3}} + C$

Answer: C



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

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

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

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

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

Answer: B



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$$4. \int 3\sqrt{x} dx = ?$$

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

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

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

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

Answer: C



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$$5. \int \frac{1}{3\sqrt{x}} dx = ?$$

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

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

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

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

Answer: A



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6. $\int 3\sqrt{x} dx = ?$

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

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

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

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

Answer: B



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7. $\int 3^x dx = ?$

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

B. $3^x + C$

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

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

Answer: C



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8. $\int 2^{\log x} dx = ?$

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

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

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

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

Answer: B



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9. $\int \cos ecx (\cos ecx + \cot x) dx = ?$

A. $\cot x - \cos ecx + C$

B. $-\cot x + \cos ecx + C$

C. $\cot x + \cos ecx + C$

D. $-\cot x - \cos ec + C$

Answer: D



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10. Evaluate $\int \frac{\sec x}{(\sec x + \tan x)} dx$.

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

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

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

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

Answer: B



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

A. $\tan x + x + C$

B. $\tan x - x + C$

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

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

Answer: B



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

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

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

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

D. none of these

Answer: C



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

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

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

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

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

Answer: A



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14. $\int \frac{(\cos 2x - \cos 2\alpha)}{(\cos x - \cos \alpha)} dx = ?$

A. $2 \sin x + 2x \cos \alpha + C$

B. $2 \sin x - 2x \cos \alpha + C$

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

D. $-2 \sin x - 2x \cos \alpha + C$

Answer: A



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15. $\int \sqrt{1 + \cos 2x} dx = ?$

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

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

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

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

Answer: B



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16. $\int \sqrt{1 + \sin 2x} dx$

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

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

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

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

Answer: C



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

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

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

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

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

Answer: D



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18. $\int \frac{1}{1 - \cos 2x} dx$

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

B. $2 \cot x + C$

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

D. $-2\cot x + C$

Answer: C



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19. $\int \frac{\sin 2x}{\sin x} dx = ?$

A. $2\sin x + C$

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

C. $2\cos x + C$

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

Answer: A



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

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

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

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

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

Answer: B



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21. $\int \cot^2 x dx = ?$

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

B. $\cot x - x + C$

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

D. $\cot x + x + C$

Answer: A



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

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

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

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

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

Answer: C



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23. $\int \frac{\sec^2 x}{\operatorname{cosec}^2 x} dx$

A. $\tan x + x + C$

B. $\tan x - x + C$

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

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

Answer: B



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24. Evaluate the following integrals :

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

A. $x + \sin x + C$

B. $x - \sin x + C$

C. $\sin x - x + C$

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

Answer: B



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25. $\int \frac{\cot x}{(\cos ecx - \cot x)} dx = ?$

A. $-\cos ecx - \cot x - x + C$

B. $\cos ecx - \cot x - x + C$

C. $-\cos ecx + \cot x - x + C$

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

Answer: A



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$$26. \int \frac{\sin x}{1 + \sin x} dx$$

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

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

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

D. none of these

Answer: B



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27. $\int \frac{(1 + \sin x)}{(1 - \sin x)} dx = ?$

A. $2 \sin x + 2 \sec x + x + C$

B. $2 \tan x + 2 \sec x - x + C$

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

D. none of these

Answer: B



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

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

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

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

D. none of these

Answer: A



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$$29. \int \sin^{-1}(\cos x) dx = ?$$

A. $\cos ecx + C$

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

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

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

Answer: C



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$$30. \int \tan^{-1} \left\{ \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}} \right\} dx = ?$$

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

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

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

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

Answer: D



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31. $\int \cot^{-1} \left(\frac{\sin 2x}{1 - \cos 2x} \right) dx = ?$

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

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

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

D. $2x^2 + C$

Answer: C



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

A. $-x^2 + C$

B. $x^2 + C$

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

D. $2x^2 + C$

Answer: B



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

A. $x^2 + C$

B. $-x^2 + C$

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

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

Answer: A



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34. $\int \tan^{-1}(\cos ecx - \cot x) dx = ?$

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

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

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

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

Answer: A



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

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

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

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

D. none of these

Answer: B



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36. $\int \frac{ax + b}{cx + d} dx$

A. $\frac{ax}{c} + \log|cx + d| + C$

B. $\frac{a}{c} + \log|cx + d| + C$

C. $\frac{ax}{c} + \frac{(bc - ad)}{c^2} \log|cx + d| + C$

D. none of these

Answer: C



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37. $\int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cdot \cos^2 x} dx$

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

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

C. $\sec x - \cos ec + X$

D. none of these

Answer: C



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38. $\int \frac{\sin x}{\sin(x - \alpha)} dx = ?$

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

B. $x \sin \alpha + (\sin \alpha) \log |\sin(x - \alpha)| + C$

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

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

Answer: A



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39. $\int \sin 3x \sin 2x dx = ?$

A. $-\frac{1}{5} \cos 5x + C$

B. $\frac{1}{2} \sin x + \frac{1}{10} \sin 5x - C$

C. $\frac{1}{2} \sin x - \frac{1}{10} \sin 5x - + C$

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

Answer: C



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40. $\int \cos 3x \sin 2x dx = ?$

A. $\frac{1}{2} \cos x - \frac{1}{10} \cos 5x + C$

B. $-\frac{1}{2} \sin x + \frac{1}{10} \sin 5x + C$

C. $-\frac{1}{2} \cos x + \frac{1}{10} \cos 5x + C$

D. none of these

Answer: A



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41. $\int \cos 4x \cos x dx = ?$

A. $\frac{1}{10} \sin 5x + \frac{1}{6} \sin 3x + C$

B. $\frac{1}{5} \cos 5x - \frac{1}{3} \cos 3x + C$

C. $\frac{1}{10} \sin 5x + \frac{1}{6} \sin 3x + C$

D. none of these

Answer: C



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