



MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

INTEGRALS

EXAMPLES

1. Write the anti derivative of $\left(3\sqrt{x} + \frac{1}{\sqrt{x}}\right)$.

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

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3. Integrate : $\int \frac{1 - \sin x}{\cos^2 x} dx$.

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

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5. Evaluate : $\int \frac{\sin^2 x}{1 + \cos x} dx$.

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6. Evaluate the following integrals:

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

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7. Evaluate the following integrals:

$$\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx$$

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8. Evaluate:

$$\int \sqrt{1 + \cos 2x} dx$$

(ii) $\int \sqrt{1 + \sin 2x} dx.$

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9. Show that

$$f(x) = \tan x - \cot x - x + \frac{\pi}{4} + 1$$

if:

$$f'(x) = \sec^2 x + \operatorname{cosec}^2 x - 1 \text{ and } f(x) = 1, \text{ when } x = \frac{\pi}{4}.$$

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10. Integrate the following w.r.t x:

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

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11. Integrate: $\int \frac{x^3}{\sqrt{1 - x^8}} dx$

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12. Find $\int \frac{\sqrt{x}}{\sqrt{a^3 - x^3}} dx$

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13. $\int \frac{\sec^2 x}{\sqrt{\tan^2 x + 4}} dx$

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

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15. Find $\int \frac{\sin 2x \cos 2x dx}{\sqrt{9 - \cos^4(2x)}}$

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

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17. Integrate: $\int \frac{dx}{2 + \cos x}$

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18. Integrate: $\int e^x \sin x dx$.

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19. $\int e^{ax} \cos(bx + c) dx$

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20. Integrate: $\int e^x \sin^2 x dx$.

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21. Evaluate: $\int \frac{e^{\tan^{-1} x}}{1 + x^2} dx$

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22. Evaluate : $\int \frac{1}{x^2 - 16} dx$.

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23. Evaluate: $\int \frac{dx}{x^2 - 6x + 13}$

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24. Evaluate: $\int \frac{2x - 3}{x^2 + 3x - 18} dx$

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25. Evaluate $\int -115x^4 \sqrt{x^5 + 1} dx$

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

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

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28. Evaluate the following integrals: $\int_0^a \sin^{-1} \sqrt{\frac{x}{a+x}} dx$

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29. Evaluate the following :

$$\int_0^{11/\sqrt{2}} \frac{\sin^{-1} x}{(1-x^2)^{3/2}} dx.$$

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30. Evaluate : $\int_0^{\pi} e^{2x} \sin\left(\frac{\pi}{4} + x\right) dx$

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31. Evaluate: $\int_0^1 \sin^{-1}\left(x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}\right) dx.$

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EXERCISE 7(a) SHORT ANSWER TYPE

1. Find an antiderivative (or integral) of the following $\cos 3x$ (ii) $3x^2 + 4x^3$ (iii) $(ax + b)^2$ (iv) $\sin 2x - 4e^{3x}$

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2. Write down the integral of the following

$$x^4 + x^{-5}$$

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3. Write down the integral of the following (i) $\frac{1}{x}, x \neq 0$ (ii)

$$x + \frac{1}{x}, x \neq 0$$

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4. Write down the integral of the following (i) $x^{2/3} + 1$ (ii)

$$\left(\frac{3}{\sqrt{x}} + 5x^4 \right)$$

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5. Write down the integral of the following

$$\cos 2x$$



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6. Write down the integral of the following (i) $\sin x + \cos x$ (ii)

$$\cos ecx(\cos ecx + \cot x)$$



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7. Write down the integral of the following (i) 5^x (ii) $x^{3/2} + 2e^x - \frac{1}{x}$.



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8. Write down the integral of the following

$$2x - 3 \cos x + e^x$$



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9. Evaluate the following integrals :

$$\int (3 \cos e c^2 x - 5x + \sin x) dx.$$

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10. Evaluate the following integrals :

$$\int (\sin x + \cos x + x^{5/2}) dx.$$

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EXERCISE 7(a) LONG ANSWER TYPE QUESTION

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

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2. Evaluate the following :

$$\int (\cos x + \cos ec^2 x - x^8 + 1) dx.$$



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3. Evaluate the following :

$$\int (e^x + 3 \cos x - 4x^3 + 2) dx.$$



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4. $\int (e^{x \log a} + e^{a \log x} + e^{a \log a}) dx$



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5. Evaluate the following :

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



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6. Evaluate the following :

$$\int \frac{(x - 4)^3}{x^2} dx.$$

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

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8. Evaluate the following :

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

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9. If $f'(x) = x - \frac{3}{x^2}$, $f(1) = \frac{11}{2}$, find $f(x)$.

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10. If $f'(x) = a \sin x + b \cos x$ and $f'(0) = 4$, $f(0) = 3$, $f\left(\frac{\pi}{2}\right) = 5$, find $f(x)$.

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EXERCISE 7(b) SHORT ANSWER TYPE Frequently Asked Question FAQ

1. Evaluate the following

$$\int \frac{2x + 9}{x^2 + 9x + 30} dx.$$

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2. Evaluate: $\int x \sqrt{x^2 + 1} dx$.

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3. Evaluate: $\int \frac{dx}{\sqrt{x+3} - \sqrt{x+2}}$.

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4. Find: $\int \cos 6x \sqrt{1 + \sin 6x} dx$.

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5. Integrate: $\int \cos^3 x \sin^4 x dx$.

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

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

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8. (i) $\int \frac{\sin(x - a)}{\sin x} dx$

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9. Integrate : $\int \frac{\tan^4 \sqrt{x} \sec^2 \sqrt{x}}{\sqrt{x}} dx.$

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10. Evaluate: $\int \frac{(x^4 - x)^{1/4}}{x^5} dx$

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

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EXERCISE 7(b) SHORT ANSWER TYPE

1. (i) $\int \sin mx dx$

(ii) $\int 2x \sin(x^2 + 1) dx$ (iii) $\int x \sqrt{1 + 2x^2} dx$.

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2. Evaluate $\int \frac{\sin(\log x)}{x} dx$

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3. (i) $\int \frac{x}{9 - 4x^2} dx.$

(ii) $\int (ax + b)^3 dx$

(iii) $\int \frac{\sec x}{\log(\sec x + \tan x)} dx.$

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

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5. (i) $\int \tan^2(2x - 3) dx$

(ii) $\int \sec^2(7 - 4x) dx$

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6. (i) $\int \frac{\sin x}{1 + \cos x} dx.$

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

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

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8. $\int \sqrt{ax + b} dx.$

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9. $\int \frac{6x - 8}{3x^2 - 8x + 5} dx$

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10. $\int \frac{\cos x - \sin x}{(\cos x + \sin x) dx}$

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11. (i) $\int x \sqrt{x+2} dx$

(ii) $\int \frac{x}{\sqrt{x+4}} dx, x > 0$

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

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13. (i) $\int \frac{1}{\sqrt{x} + x} dx$

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

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14. $\int x^2 \sin x^3 dx$

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EXERCISE 7(b) LONG ANSWER TYPE QUESTION

1. (i) $\int \sin^2 x \cos^3 x dx$

(ii) $\int \sin^3 x \cos^2 x dx$

(iii) $\int \sin^3 x \cos^3 x dx$

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2. $\int \sin x \sin(\cos x) dx.$

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3. (i) $\int \tan^3 x dx$ (ii) $\int \tan^4 x dx$.

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

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

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6. (i) $\int \frac{1 + \tan x}{x + \log \sec x} dx$
(ii) $\int \frac{1 + \cot x}{x + \log \sin x} dx$.

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

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8. Evaluate $\int e^{3 \log x} (x^4 + 1)^{-1} dx$

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

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10. Evaluate :

$$\int \frac{\sin 2x}{(a + b \cos x)^2} dx$$

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11. $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$

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12. (i) $\int \frac{\sin(\tan^{-1} x)}{1 + x^2} dx$

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

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

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

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15. $\int \sec^4 x dx$

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16. (i) $\int \frac{1 - \tan x}{1 + \tan x} dx$
(ii) $\int \frac{1 - \cot x}{1 + \cot x} dx$

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17. $\int x e^{x^2} dx$

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18. $\int \frac{e^{2x} - 1}{e^{2x} + 1} dx = ?$

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

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20. (i) $\int e^x \sec^2(e^x) dx$

(ii) $\int e^x \cos ec^2(e^x) dx$

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

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

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

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



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23. (i) $\int \frac{\log x}{x} dx$

(ii) $\int \frac{(\log x)^2}{x} dx$



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



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25. (i) $\int \frac{\sin(\log x)}{x} dx$

(ii) $\int \log x \frac{\sin[1 + (\log x)^2]}{x} dx$



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26. $\int 2x \sec^3(x^2 + 3) \tan(x^2 + 3) dx$

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27. Evaluate: $\int x^2 e^{x^2 + 3} \cos(e^{x^2 + 3}) dx$

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28. (i) $\int \frac{\cos x - \sin x}{\sqrt{1 + \sin 2x}} dx$

(ii) $\int \frac{\cos x}{\left(\cos\left(\frac{x}{2}\right) + \sin\left(\frac{x}{2}\right)\right)} dx$

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EXERCISE (7d) SHORT ANSWER TYPE QUESTIONS

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

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



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

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

(iii) $\int \frac{dx}{4 + 9x^2}$



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

(ii) $\int \frac{1}{9x^2 + 6x + 5} dx$



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

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

(ii) $\int \frac{1}{\sqrt{9+x^2}} dx$

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

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6. $\int \frac{1}{\sqrt{a^2+b^2x^2}} dx$

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

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8. (i) $\int \frac{1}{\sqrt{x^2 - 25}} dx$

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

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9. Evaluate: $\int x \sqrt{x^4 + 1} dx$

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10. $\int \sqrt{1 + \frac{x^2}{9}} dx$

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11. (i) $\int \frac{dx}{e^x + e^{-x}}$

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



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

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



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13. v36.1



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14. $\int \frac{x^2}{\sqrt{x^6 - a^6}} dx$



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

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16. (i) $\int \frac{2^x}{\sqrt{1 - 4^x}} dx$

(ii) $\int \sqrt{e^x - 1} dx$

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EXERCISE (7d) LONG ANSWER TYPE QUESTION (I)

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

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$$2. (i) \int \frac{1}{4 \sin^2 x + 5 \cos^2 x} dx$$

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

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

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$$4. \int \frac{dx}{1 + 3 \sin^2 x + 8 \cos^2 x}$$

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$$5. \int \frac{\cos x}{\sqrt{4 - \sin^2 x}} dx$$

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

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7. (i) $\int \sqrt{\frac{a+x}{a-x}} dx$ (ii) $\int \sqrt{\frac{a-x}{a+x}} dx$

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8. $\int \frac{(\sin x + \cos x)}{\sqrt{\sin 2x}} dx$

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9. Prove that:

$$\int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1} \left(\frac{x}{a} \right) + c$$

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EXERCISE 7(e) FAQ

1. Evaluate: $\int x^2 e^{3x} dx$

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2. $\int \cos \sqrt{x} dx$

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3. Evaluate the following

(i) $\int x \log(1+x) dx$

(ii) $\int x \log^2 x dx$

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

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5. Evaluate: $\int \log x dx$

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

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7. Find: $\int \sin^{-1}(2x) dx$

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8. Evaluate :

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

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7(e) SHORT ANSWER QUESTION TYPE

1. v31

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2. $\int x \sin x dx$

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3. Evaluate $\int x \sin 3x dx$.

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4. Evaluate $\int x \cos x dx$.

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5. (i) $\int x \sec^2 x dx$ (ii) $\int x \cos^2 x dx$

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6. $\int x \cos 2x \sin 4x dx$

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7. (i) $\int \sec^3 x dx$ (ii) $\int \cos e^{c^3} x dx$

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8. $\int \sin \sqrt{x} dx$

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9. (i) $\int x^2 e^x dx$

(ii) $\int x^2 e^{3x} dx$

(ii) $\int x^3 e^x dx$

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10. $\int x^2 e^{-2x} dx$

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11. (i) $\int x^2 \sin x dx$

(ii) $\int x^2 \sin 2x dx$



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12. $\int (1 - x^2) \sin 2x dx$

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13. $\int x^2 \cos^2 x dx$

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14. Evaluate: (i) $\int x \cos^3 x^2 \sin x^2 dx$ (ii) $\int \sin^7 x dx$

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15. (i) $\int x^3 \sin x^2 dx$ (ii) $\int x^3 \cos x^2 dx$

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16. $\int x^{2n-1} \cos x^n dx$

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17. $\int (\tan^{-1} x^2) x dx$

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18. $\int x \log x, dx$

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19. (i) $\int x^2 \log x dx$

(ii) $\int (x^2 + 1) \log x dx$

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EXERCISE 7(e) LONG ANSWER TYPE QUESTION (I)

1. $\int x^3 \log x dx$

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2. Evaluate : $\int x^n \log x dx$.

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

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4. $\int \log(5+t) dt$

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5. $\int (\log x)^2 dx =$

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6. $\int \sin x \cdot \log \cos x dx$

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7. (i) $\int x \sin^{-1} x dx$

(ii) $\int x \cos^{-1} x dx$

(iii) $\int x \tan^{-1} x dx$

(iv) $\int x \cot^{-1} x dx$

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8. (i) $\int \sin^{-1} x dx$

(ii) $\int \cos^{-1} x dx$

(iii) $\int \cot^{-1} x dx$

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9. (i) $\int \tan^{-1} \sqrt{x} dx$ (ii) $\int \sin^{-1} \sqrt{x} dx$

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10. (i) $\int \frac{x \cos^{-1} x}{\sqrt{1-x^2}} dx$ (ii) $\int \frac{x \tan^{-1} x}{(1+x^2)^{3/2}} dx$

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11. $\int x^2 \sin^{-1} x dx$

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$$12. \int \tan^{-1} \left(\frac{3x - x^3}{1 - 3x^2} \right) dx$$

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$$13. \int \tan^{-1} \left(\sqrt{\frac{1-x}{1+x}} \right) dx$$

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$$14. \int \frac{x \tan^{-1} x}{(1+x^2)^{\frac{3}{2}}} dx$$

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$$15. \int x^2 \log x dx.$$

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EXERCISE 7(e) LONG ANSWER TYPE QUESTION (II)

1. $\int \cos 2\theta \cdot \ln \left(\frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} \right) d\theta$



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EXERCISE 7(f)

1. $\int e^x \cos x \cdot dx$



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



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3. $\int e^x \cos 2x dx$

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4. $\int e^x \cos 3x dx$

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5. (i) $\int e^{3x} \cos 5x dx$

(ii) $\int e^{3x} \sin 4x dx$

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6. $\int e^{2x} \sin x dx$

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7. $\int e^{2x} \sin x \cos x dx$

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8. Evaluate $\int e^x \cos^2 x dx$

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

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10. $\int x^2 e^{x^3} \cos x^3 dx$

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11. Evaluate: $\int e^{ax} \cos bx \, dx$

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12. Evaluate: $\int e^{ax} \sin(bx + c) \, dx$

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EXERCISE 7(f) FAQ

1. Evaluate the following integrals:

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

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2. Integrate: $\int e^x \left(\frac{x^2 + 1}{(x + 1)^2} \right) dx.$

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3. Find: $\int \frac{2x - 5}{(2x - 3)^3} e^{2x} dx.$

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4. Find: $\int e^x \frac{\sqrt{1 + \sin 2x}}{1 + \cos 2x} dx.$

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

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EXERCISE 7(g) SHORT TYPE QUESTION

1. $\int e^x (\cos x + \sin x) dx$

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

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

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4. $\int e^x (\tan x + 1) \sec x dx$

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5. Evaluate $\int \frac{e^x(1 + \sin x)}{1 + \cos x} dx$

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6. Evaluate: $\int e^x \left(\frac{1 - \sin x}{1 - \cos x} \right) dx$

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7. Evaluate: $\int e^x \left(\frac{\sin 4x - 4}{1 - \cos 4x} \right) dx$

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8. $\int e^x (\cot x + \log \sin x) dx$

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9. $\int \cos ecx(\cot x - 1)e^x dx$

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

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

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12. v20.1

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13. Evaluate $\int \frac{x e^x}{(1+x)^2} dx$

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EXERCISE 7(g) LONG ANSWER TYPE QUESTION (I)

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

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2. (i) $\int \frac{2-x}{(1-x)^2} e^x dx$

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

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3. $\int e^x \frac{1 + \sin x \cos x}{\cos^2 x} dx$ is equal to

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4. Evaluate: $\int \{s \in (\log x) + \cos(\log x)\} dx$

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

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6. (i) $\int e^{2x} \left(\frac{1 + \sin 2x}{1 + \cos 2x} \right) dx$

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

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7. $\int \frac{2 + \sin x}{1 + \cos x} e^{x/2} dx$

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$$8. \int \left\{ \frac{1}{(\log x)} - \frac{1}{(\log x)^2} \right\} dx = ?$$

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EXERCISE 7 (h) SHORT ANSWER TYPE QUESTION

$$1. (i) \int \frac{1}{1-x^2} dx$$

$$(ii) \int \frac{1}{x^2-9} dx$$

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$$2. \int \frac{1}{9x^2-1} dx$$

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3. Evaluate: $\int \frac{1}{a^2 - b^2 x^2} dx$

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EXERCISE 7(h) FAQ

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

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2. Evaluate: $\int \frac{(x - 1)(x - 2)(x - 3)}{(x - 4)(x - 5)(x - 6)} dx$

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

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

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5. Find: $\int \left(\frac{\cos \theta}{(4 + \sin^2 \theta)(5 - 4 \cos^2 \theta)} d\theta \right)$

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EXERCISE 7(i) SHORT ANSWER TYPE QUESTIONS

1. (i) $\int \frac{x dx}{x^2 + 3x + 2}$
(ii) $\int \frac{x}{x^2 + 5x + 6} dx$

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

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

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

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EXERCISE 7(i) LONG ANSWER TYPE QUESTIONS (I)

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

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2. Evaluate: $\int \frac{x^2 + 5x + 3}{x^2 + 3x + 2} dx$

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

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

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5. integrate this $\int \frac{x^2 + 1}{x^2 - 5x + 6} dx$

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

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

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

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

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10. $\int \frac{ax^2 + bx + c}{(x - a)(x - b)(x - c)} dx$; a, b, c are distinct

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

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

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

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

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14. $\int \frac{5x^3 + 18x^2 - 10x - 6}{x(x + 3)(5x - 2)} dx$

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

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16. $\int \frac{x}{(x - 1)^2(x - 2)} dx$

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

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

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

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20. (i) $\int \frac{1}{1 - x^3} dx$

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

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

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

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



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$$22. \int \frac{1}{x + x^2 + x^3} dx$$

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$$23. \int \frac{x^4}{x^4 - 16} dx$$

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$$24. (i) \int \frac{x dx}{x^3 + x^2 + x + 1}$$

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

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$$25. \text{Evaluate } \int \frac{5x}{(x + 1)(x^2 + 9)} dx$$

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

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

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28. (i) $\int \frac{x^2+1}{(x^2+4)(x^2+25)} dx$ (ii) $\int \frac{2x^2+1}{x^2(x^2+4)} dx$

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

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30. (i) $\int \frac{2x}{(x^2 + 1)(x^2 + 3)} dx$

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



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31. (i) $\int \frac{\sin 2x}{(1 + \sin x)(2 - \sin x)} dx$

(ii) $\int \frac{\cos x}{(1 + \sin x)(2 - \sin x)} dx$

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

(iv) $\int \frac{(3 \sin x - 2) \cos x}{13 - \cos^2 x - 7 \sin x} dx$

(v) $\int \frac{\sin \theta}{(4 + \cos^2 \theta)(2 - \sin^2 \theta)} d\theta.$



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32. Find $\int \frac{(3 \sin \varphi - 2) \cos \varphi}{5 - \cos \varphi - 4 \sin \varphi} d\varphi$



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$$33. \int \frac{\cos x}{(1 + \sin x)(2 + \sin x)} dx$$

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$$34. (i) \int \frac{e^x dx}{e^x (e^x - 1)}$$

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

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

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$$35. \int \frac{\sec^2 x}{(\tan x + 1)(\tan x + 2)} dx$$

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$$36. (i) \int \frac{\log x}{x(1 + \log x)(2 + \log x)} dx$$

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$$37. \int \frac{\sec x}{1 + \cos ecx} dx$$

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EXERCISE 7(i) LONG ANSWER QUESTION TYPE (II)

$$1. \int \frac{2 \sin 2\theta - \cos \theta}{6 - \cos^2 \theta - 4 \sin \theta} d\theta$$

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

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3. Evaluate the following Integrals :

$$\int \frac{\tan^{-1}}{x^2} \cdot dx$$

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EXERCISE 7(j) FAQ

1. $\int \frac{x + 2}{\sqrt{x^2 + 5x + 6}} dx$

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2. Choose the correct answer $\int \sqrt{x^2 - 8x + 7} dx$ (A)

$\frac{1}{2}(x - 4)\sqrt{x^2 - 8x + 7} + 9 \log|x - 4 + \sqrt{x^2 - 8x + 7}| + C$ (B)

$\frac{1}{2}(x + 4)\sqrt{x^2 - 8x + 7} + 9 \log|x + 4 + \sqrt{x^2 - 8x + 7}| + C$ (C)

$\frac{1}{2}(x - 4)\sqrt{x^2 - 8x + 7} - 3\sqrt{2} \log|x - 4 + \sqrt{x^2 - 8x + 7}| + C$

(D) $\frac{1}{2}(x-4)\sqrt{x^2-8x+7}$ -



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3. Evaluate: $\int (2x + 3) \sqrt{x^2 + 4x + 3} dx$

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

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5. Evaluate: $\int \frac{e^x}{\sqrt{5 - 4e^x - e^{2x}}} dx$

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6. Evaluate: $\int \frac{\sec^2 x}{\sqrt{\tan^2 x + 2 \tan x + 5}} dx$

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7. Evaluate: $\int \frac{\sin 2x}{\sqrt{\sin^4 x + 4 \sin^2 x - 2}} dx.$

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EXERCISE 7(j) LONG ANSWER TYPE QUESTION (I)

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

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

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

(ii) $\int \frac{dx}{\sqrt{8+3x-x^2}}$

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3. (i) $\int \frac{dx}{\sqrt{16 - 6x - x^2}}$

(ii) $\int \frac{dx}{\sqrt{7 - 6x - x^2}}$

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4. Evaluate $\int \frac{dx}{\sqrt{7 + 3x + 2x^2}}$

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

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EXERCISE 7(k) LONG ANSWER TYPE QUESTION (I)

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

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

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

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

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

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

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$$7. (i) \int \frac{dx}{x\sqrt{x^2 - 1}} \quad (ii) \int \frac{dx}{x\sqrt{ax - x^2}}$$

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$$8. \int \frac{dx}{(x - 1)\sqrt{x^2 + 4}}$$

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$$9. \int \frac{dx}{(x^2 - 1)\sqrt{x - 1}}$$

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

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11. $\int \frac{\cos x}{\sin x + \sqrt{\sin x}} dx$

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

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SUB CHAPTER 7.3 EXERCISE 7(m)FAQ

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

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

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3. Evaluate the following integrals as limit of sum: $\int_1^4 (3x^2 + 2x) dx$

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4. Evaluate: $\int_0^2 (x^2 + x + 1) dx$ as the limit of a sum.

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5. Evaluate: $\int_0^2 e^x dx$ as a limit of sum.

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6. Evaluate: $\int_1^3 (x^2 + 3x + e^x) dx$

A. $(-e^2 - 1)$

B. $(e^2 + 1)$

C. $(e^2 - 1)$

D. None of these

Answer: C



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7. Evaluate: $\int_{-1}^2 (e^{3x} + 7x - 5) dx$ as a limit of sums.



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8. Evaluate: $\int_a^b \sin x dx$ as the limit of a sum.

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9. Sketch the regions represented by the following:

(i) $\int_0^1 x^2 dx$ (ii) $\int_0^{\frac{\pi}{2}} \sin x dx$

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SUB CHAPTER 7.3 EXERCISE 7(m) LONG ANSWER TYPE QUESTION (I)

1. (i) $\int_a^b x dx$

(ii) $\int_1^2 x dx$

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2. (i) $\int_1^2 x^2 dx$

(ii) $\int_2^3 x^2 dx$

(iii) $\int_0^4 x^2 dx$

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3. (i) $\int_0^4 (x + 1) dx$

(ii) $\int_0^5 (x + 1) dx$

(iii) $\int_0^3 (x + 4) dx$

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4. (i) $\int_0^4 (2x + 3) dx$

(ii) $\int_0^4 (2x - 1) dx$

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5. (i) $\int_1^4 (x^2 - x) dx$

(ii) $\int_0^2 (x^2 + 1) dx$

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6. (i) $\int_0^3 (x^2 + 1) dx$

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SUB CHAPTER 7.3 EXERCISE 7(n) FAQ

1. Evaluate: $\int_0^{\pi/2} e^x (\sin x - \cos x) dx$

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2. If $\int_0^a \frac{1}{4 + x^2} dx = \frac{\pi}{8}$, find the value of a .

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3. Evaluate: $\int_0^2 \sqrt{4 - x^2} dx$

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4. Evaluate the following integrals:

(i) $\int_2^3 x^2 dx$

(ii) $\int_1^3 \frac{x}{(x + 1)(x + 2)} dx$

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5. Evaluate the following:

$$\int_0^\pi \cos x dx$$

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6. Evaluate :

$$\int_0^2 (2x^2 + 3x + 1) dx \text{ by second Fundamental Theorem.}$$

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7. Evaluate: $\int_0^{\pi/4} \sec x \cdot \sqrt{\frac{1 - \sin x}{1 + \sin x}} dx$

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8. Evaluate the following integral: $\int_0^{\pi/2} \frac{x + \sin x}{1 + \cos x} dx$

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9. IF $\int_0^a \sqrt{x} dx = 2a \int_0^{\pi/2} \sin^3 x dx$, find $\int_a^{a+1} x dx$.

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10. The marginal cost of a manufacture is given by:

$$MC = \frac{250x}{\sqrt{x^2 + 40}}$$

where 'x' is the number of units (in thousands) produced. If 'x' increases from 3,000 to 9,000 units, find the total increase in cost.

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SUB CHAPTER 7.3 EXERCISE 7(n) SHORT ANSWER TYPE QUESTIONS

1. (i) $\int_4^5 1dx$ (ii) $\int_{-1}^2 xdx$

(iii) $\int_0^4 x^{1/2} dx$

(iv) $\int_0^4 x^{3/2} dx$

(v) $\int_0^8 x^{5/3} dx$

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$$2. (i) \int_2^3 \frac{1}{x} dx$$

$$(ii) \int_1^2 \frac{1}{x^2} dx$$

$$(iii) \int_1^e \frac{dx}{x}$$

$$(iv) \int_{-1}^1 (x + 1) dx$$

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$$3. \int_2^4 (x^2 - 1) dx$$

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$$4. (i) \int_0^1 \frac{dx}{\sqrt{1-x^2}}$$

$$(ii) \int_0^1 \frac{dx}{\sqrt{1+x^2}}$$

$$(iii) a \int_1^{\sqrt{3}} \frac{dx}{1+x^2}$$

$$b \int_0^1 \frac{dx}{1+x^2}$$

$$(iv) \int_0^{2/3} \frac{dx}{4 + 9x^2}$$

$$(v) \int_0^1 \frac{x}{x^2 + 1} dx$$

$$(vi) \int_2^3 \frac{x}{x^2 + 1} dx$$

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$$5. (i) \int_0^1 \frac{dx}{3x - 4} \quad (ii) \int_1^3 \frac{dx}{7 - 2x}$$

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$$6. \int_0^1 x(1 - x)^5 dx$$

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7. Evaluate:

$$\int_0^{\pi/2} \sin x dx$$



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8. (i) $\int_0^{\pi/2} \cos x dx$ (ii) $\int_{-\pi/2}^{\pi/2} \cos x dx$ (iii) $\int_0^{\pi/2} \cos 2x dx$

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9. (i) $\int_0^{\pi/4} \tan x dx$ (ii) $\int_{\pi/4}^{\pi/2} \cot x dx$

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10. (i) $\int_0^{\pi/4} \sec x dx$
(ii) $\int_{\pi/6}^{\pi/4} \cos ecx dx$

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11. $\int_0^1 3^x dx$



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12. (i) $\int_0^{\frac{\pi}{2}} \sin^2 x dx$

(ii) $\int_0^{\pi/2} \cos^2 x dx$



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13. $\int_0^{\pi/2} \sin^3 x dx$



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14. (i) $\int_0^{\pi} \left(\frac{\sin^2 x}{2} - \frac{\cos^2 x}{2} \right) dx$

(ii) $\int_0^{\pi/2} \frac{\sin^2 x}{(1 + \cos x)^2} dx$



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15. $\int_0^1 \left(xe^x + \sin\left(\frac{\pi x}{4}\right) \right) dx$

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16. Find the value of the following: $\int_0^1 \frac{dx}{1+x^2}$

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17. $\int_2^3 \frac{dx}{x^2 - 1}$

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18. Evaluate the following: $\int_1^2 \frac{5x^2}{x^2 + 4x + 3} dx$

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19. (i) $\int_1^3 \frac{3x}{9x^2 - 1} dx$

(ii) $\int_2^3 \frac{x}{x^2 + 1} dx$

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20. $\int_{-\pi/4}^0 \frac{1 + \tan x}{1 - \tan x} dx$

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21. If $\int_0^k \frac{1}{2 + 8x^2} dx = \frac{\pi}{16}$, find the value of k .

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22. Evaluate: $\int_0^4 \frac{1}{\sqrt{x^2 + 2x + 3}} dx$

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23. (i) $\int_0^1 x e^x dx = 1$

(ii) $\int_0^1 \tan^{-1} x dx = \frac{\pi}{4} - \frac{1}{2} \log 2$

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24. $\int_0^{\pi/4} 2 \tan^3 x dx = 1 - \log 2$

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25. $\int_0^1 \sin^{-1} x dx = \frac{\pi}{2} - 1$

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26. If $\int_0^a 3x^2 dx = 8$, find the value of a .

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27. $\int_0^{\pi/4} \tan x dx$

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28. $\int_0^{\pi/2} x^2 \sin x dx$

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29. $\int_0^{\pi/2} x^2 \cos 2x dx$

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30. Evaluate the integrals $\int -11 \frac{dx}{x^2 + 2x + 5}$

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31. (i) $\int_1^2 \frac{dx}{(x+1)(x+2)}$ (ii) $\int_1^2 \frac{x+3}{x(x+2)} dx$

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32. $\int_1^3 \frac{dx}{x^2(1+x)}$

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33. $\int_0^\pi \frac{x dx}{a^2 \cos^2 x}, (a > 1)$

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34. $\int_3^4 \frac{dx}{\sqrt{x^2+4}}$

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35. Evaluate the following :

$$\int_{\pi/2}^{\pi} e^x \left(\frac{1 - \sin x}{1 - \cos x} \right) dx.$$

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36. $\int_1^2 \left(\frac{1}{x} - \frac{1}{2x^2} \right) e^{2x} dx$ is equal to

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37. $\int_0^1 \frac{1}{\sqrt{x+3} - \sqrt{x+1}} dx$

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38. $\int_0^1 (\cos^{-1} x)^2 dx.$

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39. Prove that: $\int_0^{\pi/2} \cos^4 x dx = \frac{3\pi}{16}$

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40. If the marginal revenue (MR) function is defined as the rate of change of total revenue (R) with respect to the quantity demanded at an instant. IF the marginal revenue of a function is given by:

$$MR = 25e^{-x/400} \left(1 - \frac{x}{100} \right)$$

find the total revenue function through integration, putting the condition that $R=6$ when $x=0$

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41. IF the marginal cost is defined as the rate of change of total cost with respect to the number of units of the product, The marginal cost of producing x units of a product is given by marginal cost

$= 2x\sqrt{x+5}$. The cost of producing 4 units of the product is Rs

314.40 . Find the cost function.

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42. If $f(x)$ is of the form $f(x) = a + bx + cx^2$, show that

$$\int_0^1 f(x)dx = \frac{1}{6} \left\{ f(0) + 4f\left(\frac{1}{2}\right) + f(1) \right\}$$

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43. (A) For each of the following function $f(x)$, verify that:

$$\int_0^2 f(x)dx = \int_0^1 f(x)dx + \int_1^2 f(x)dx : \text{(i) } f(x)=x+2 \text{ (ii) } f(x)=x^2 + 2$$

(iii) $f(x)=e^x$ (B) For each of the following pairs of function $f(x)$ and

$$g(x), \text{ verify that: } \int_0^1 [f(x) + g(x)]dx = \int_0^1 f(x)dx + \int_0^1 g(x)dx :$$

(i) $f(x)=1, g(x)=x^2$ (ii) $f(x) = e^x, g(x) = 1$

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1. Prove that: $\int_0^{2a} f(x)dx = \int_0^{2a} f(2a - x)dx$.

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2. Using properties of definite integrals, prove the following:

$$\int_0^2 x\sqrt{2-x}dx = \frac{16}{15}\sqrt{2}$$

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3. $\int_{-\pi}^{\pi} (\cos ax - \sin bx)^2 dx$

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

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5.
$$\int_{-2}^2 \frac{x^2}{1+5^x} dx$$

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6. Evaluate:
$$\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx$$

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7. Evaluate:
$$\int_0^{\pi/2} \frac{\cos^2 x}{\cos^2 x + 4\sin^2 x} dx$$

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8. Evaluate:
$$\int_0^{\pi} \frac{\cos x}{(1 + \sin x)^2} dx$$

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9. Evaluate (i) $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$

Evaluate (ii) $\int_0^{\pi} \frac{4x \sin x}{1 + \cos^2 x} dx$

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10. Evaluate: $\int_0^{2\pi} \frac{1}{1 + e^{s \in x}} dx$

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11. $\int_0^{\frac{\pi}{2}} \log(\sin x) dx$

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12. Prove that $\int_0^{\pi/2} \sin 2x \log \tan x dx = 0$

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13. Evaluate: $\int_0^{\pi} \cos 2x \log \sin x dx$

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14. Evaluate: $\int_0^1 \cot^{-1}(1 - x + x^2) dx$

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15. $\int_{-1}^{1/2} |x \cos(\pi x)| dx$

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16. Evaluate: $\int_0^1 |3x - 1| dx$

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17. Evaluate $\int_{-1}^2 |x^3 - x| dx$

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18. Evaluate: $\int_{-1}^1 \frac{x^3 + |x| + 1}{x^2 + 2|x| + 1} dx$

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19. Evaluate: $\int_0^2 |x^2 + 2x - 3| dx$

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20. Evaluate: $\int_0^{3/2} |x \sin \pi x| dx.$

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21. Evaluate: $\int_{0.5}^{3.5} [x] dx$

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22. Evaluate the following integral: $\int_0^4 (|x| + |x - 2| + |x - 4|) dx$

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23. Evaluate: $\int_{-2}^2 f(x) dx$ where

$$f(x) = \begin{cases} 2x - 1 & -2 \leq x \leq 1 \\ 3x - 2 & 1 \leq x \leq 2 \end{cases}$$

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SUB CHAPTER 7.3 EXERCISE 7(p) SHORT ANSWER QUESTION TYPE

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

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$$2. \int_0^{\frac{\pi}{2}} \frac{dx}{1 + \sqrt{\tan x}} = \int_0^{\frac{\pi}{2}} \frac{dx}{1 + \sqrt{\cot x}} = \frac{\pi}{4}$$

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3. Evaluate the following integral: $\int_0^{\pi/2} \frac{1}{1 + \tan x} dx$

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4. Evaluate the following integral: $\int_0^{\pi/2} \frac{1}{1 + \cot x} dx$

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5. Evaluate the following integral: $\int_0^{\pi/2} \frac{1}{1 + \tan^3 x} dx$

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$$6. \int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{3}{2}} x}{\sin^{\frac{3}{2}} x + \cos^{\frac{3}{2}} x} dx$$

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$$7. (i) \int_0^{\pi/2} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx$$

$$(ii) \int_0^{\pi/2} \frac{\cos^3 x}{\sin^3 x + \cos^3 x} dx$$

$$(iii) \int_0^{\pi/2} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$$

$$(iv) \int_0^{\pi/2} \frac{\cos^5 x}{\sin^5 x + \cos^5 x} dx$$

$$(v) \int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$$

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$$8. (i) \int_0^a \frac{\sqrt{x}}{\sqrt{x} + \sqrt{a-x}} dx$$

$$(ii) \int_0^5 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{5-x}} dx$$

$$(iii) \int_0^a \frac{dx}{x + \sqrt{a^2 + x^2}}$$

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$$9. (i) \int_0^1 x \sqrt{2-x} dx$$

$$(ii) \int_0^1 x^2(1-x)^n dx$$

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10. Prove that

$$\int_0^1 x(1-x)^5 dx = \frac{1}{42}$$

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11. Prove that $\int_{-a}^a f(x) dx = 0$, where 'f' is an odd function. And, evaluate, $\int_{-1}^1 \log \left[\frac{2-x}{2+x} \right] dx$

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SUB CHAPTER 7.3 EXERCISE 7(p) LONG ANSWER TYPE QUESTIONS (I)

1.
$$\int_0^{\pi/2} \frac{\cos x}{3 \cos x + \sin x} dx$$

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

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3.
$$\int_0^{\pi/2} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$$

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4. Integrate the function $f(x) = \frac{\sin x}{1 + \cos^2 x}$

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5. $\int_0^\pi \frac{x}{1 + \sin x} dx$

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6. $\int_0^\pi \frac{x}{a^2 \cos^2 x + b^2 \sin^2 x} dx$

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7. Evaluate the following integral: $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$

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$$8. \int_{-\pi/2}^{\pi/2} (5 \sin^3 x + 8 \sin x + 4 \cos^2 x) dx$$

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$$9. (i) \int_{-8}^8 (\sin^{93} x + x^{295}) dx$$

$$(ii) \int_{-1}^1 \sin^5 x \cos^4 x dx$$

$$(iii) \int_{-\pi/4}^{\pi/4} x^3 \sin^4 x dx$$

$$(iv) \int_{-1}^1 x^{17} \cos^4 x dx$$

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$$10. (i) \int_0^{\pi/2} \sin^2 x dx = \frac{\pi}{4}$$

$$(ii) \int_0^{\pi/2} \cos^2 x dx = \frac{\pi}{4}$$

$$(iii) \int_{-\pi/4}^{\pi/4} \sin^2 x dx = \frac{\pi}{4} - \frac{1}{2}$$

$$(iv) \int_{-\pi/4}^{\pi/4} \cos^2 x dx = \frac{\pi}{4} + \frac{1}{2}$$

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11. Evaluate: $\int_0^{2\pi} \cos^5 x \, dx$

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12. $\int_0^{\pi} \frac{x \sin x}{1 + \sin x} dx = \frac{\pi}{2}(\pi - 2)$

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MULTIPLE CHOICE QUESTION

1. The antiderivative of $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$ equals:

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

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

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

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

Answer: C

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2. If $\frac{d}{dx}[f(x)] = 4x^3 - \frac{3}{x^4}$ solve that $f(2) = 0$ then find $f(x)$

$$A. x^4 + \frac{1}{x^3} - \frac{129}{8}$$

$$B. x^3 + \frac{1}{x^4} + \frac{129}{8}$$

$$C. x^4 + \frac{1}{x^3} + \frac{129}{8}$$

$$D. x^3 + \frac{1}{x^4} - \frac{129}{8}$$

Answer: A

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3. $\int \frac{10x^9 + 10x^x (\log)_{e^{10}} dx}{x^{10} + 10^x}$ equals (A) $10^x - x^{10} + C$ (B) $10^x + x^{10} + C$ (C) $(10^x - x^{10})^{-1} + C$ (D) $\log(10^x + x^{10}) + C$

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

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

C. $(10^x - x^{10})^{-1} + c$

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

Answer: D

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

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

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

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

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

Answer: B

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

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

B. $\tan x + \operatorname{cosec} x + c$

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

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

Answer: A

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6. $\int \frac{e^x(1+x)}{\cos^2(e^x x)} dx$ equal to

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

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

C. $\tan(e^x) + c$

D. $\cot(e^x) + c$

Answer: B



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7. $\int \frac{dx}{x^2 + 2x + 2}$ equals (A) $x \tan^{-1}(x + 1) + C$ (B)

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

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

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

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

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

Answer: B

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8. $\int \frac{dx}{\sqrt{9x - 4x^2}}$ equals (A) $\frac{1}{9} \sin^{-1} \left(\frac{9x - 8}{8} \right) + C$ (B)
- $\frac{1}{2} \sin^{-1} \left(\frac{8x - 9}{9} \right) + C$ (C) $\frac{1}{3} \sin^{-1} \left(\frac{9x - 8}{8} \right) + C$ (D)
- $\frac{1}{2} \sin^{-1} \left(\frac{9x - 8}{9} \right) + C$
- A. $\frac{1}{9} \sin^{-1} \left(\frac{9x - 8}{8} \right) + c$
- B. $\frac{1}{2} \sin^{-1} \left(\frac{8x - 9}{9} \right) + c$
- C. $\frac{1}{3} \sin^{-1} \left(\frac{9x - 8}{8} \right) + c$
- D. $\frac{1}{2} \sin^{-1} \left(\frac{9x - 8}{9} \right) + c$

Answer: B

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$$9. \quad \int \frac{x dx}{(x-1)(x-2)} \text{ equal(A)} \quad \log \left| \frac{(x-1)^2}{x-2} \right| + C \quad (\text{B})$$

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

$$\log |(x-1)(x-2)| + C$$

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

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

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

$$\text{D. } \log |(x-1)(x-2)| + c$$

Answer: B

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$$10. \quad \int \frac{dx}{x(x^2+1)} \text{ equal(A)} \quad \log|x| - \frac{1}{2} \log(x^2+1) + C \quad (\text{B})$$

$$\log|x| + \frac{1}{2} \log(x^2+1) + C (\text{C}) \quad -\log|x| + \frac{1}{2} \log(x^2+1) + C (\text{D})$$

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

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

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

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

D. $\log|x| + \log(x^2 + 1) + c$

Answer: A



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11. Choose the correct answer $\int x^2 e^{x^3} dx$ equals (A) $\frac{1}{3}e^{x^3} + C$
(B) $\frac{1}{3}e^{x^2} + C$ (C) $\frac{1}{2}e^{x^3} + C$ (D) $\frac{1}{2}e^{x^2} + C$

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

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

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

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

Answer: A



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

A. $e^x \cos x + c$

B. $e^x \sec x + c$

C. $e^x \sin x + c$

D. $e^x \tan x + c$

Answer: B



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13. Choose the correct answer $\int \sqrt{a+x^2} dx$ is equal to (A) $\frac{x}{2} \sqrt{1+x^2} + \frac{1}{2} \log \left| \left(x + \sqrt{x+x^2} \right) \right| + C$ (B) $\frac{2}{3} (1+x^2)^{\frac{3}{2}} + C$ (C)

$$\frac{2}{3}x(1+x^2)^{\frac{3}{2}} + C \quad (\text{D}) \quad \frac{x^2}{2}\sqrt{1+x^2} + \frac{1}{2}x^2 \log|x + \sqrt{1+x^2}| + C$$

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

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

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

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

Answer: A

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14. $\int \sqrt{x^2 - 8x + 7}$ is equal to

A.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7} + 9\log|(x-4) + \sqrt{x^2-8x+7}| + c$$

B.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7} + 9\log|(x+4) + \sqrt{x^2-8x+7}| + c$$

C.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7} - 3\sqrt{2}\log|(x-4) + \sqrt{x^2-8x+7}| + c$$

D.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7} - \frac{9}{2}\log|(x-4) + \sqrt{x^2-8x+7}| + c$$

Answer: D



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15. $\int_1^{\sqrt{3}} \frac{1}{1+x^2} dx$ is equal to $\frac{\pi}{12}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{6}$ d. $\frac{\pi}{3}$

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

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

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

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

Answer: D



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16. $\int_0^{2/3} \frac{dx}{4x + 9x^2}$ equals:

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

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

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

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

Answer: C



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17. The value of the integral

$$\int_{1/3}^1 \frac{(x - x^3)^{1/3}}{x^4} dx$$
 is

A. 6

B. 0

C. 3

D. 4

Answer: A



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18. If $f(x) = \int_0^x t \sin t dt$, then $f'(x)$ is

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

B. $x \sin x$

C. $x \cos x$

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

Answer: B

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19. The value of $\int_{-\pi/2}^{\pi/2} (x^3 + x \cos x + \tan^5 x + 1) dx$ is equal to (A) 0 (B) 2 (C) π (D) none of these

A. 0

B. 2

C. π

D. 1

Answer: C

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20. The value of $\int_0^{\pi/2} \log\left(\frac{4 + 3 \sin x}{4 + 3 \cos x}\right) dx$ is:

A. 2

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

C. 0

D. -2

Answer: C

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21. Choose the correct answers $\int \frac{dx}{e^x + e^{-x}}$ is equal to (A) $\tan^{-1}(e^x) + C$ (B) $\tan^{-1}(e^{-x}) + C$ (C) $\log(e^x - e^{-x}) + C$ (D) $\log(e^x + e^{-x}) + C$

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

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

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

D. $\log(e^x + e^{-x}) + c$

Answer: A

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22. The value of $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$ is equal to

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

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

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

D. $\frac{1}{(\sin x + \cos x)^2}$

Answer: B

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23. If $f(a + b - x) = f(x)$, then $\int_a^b x f(x) dx$ is equal to (A) $\frac{a-b}{2} \int_a^b f(a+b-x) dx$ (B) $\frac{a+b}{2} \int_a^b f(b-x) dx$ (C)

$$\frac{a+b}{2} \int_a^b f(x) dx \quad (\text{D}) \quad \frac{b-a}{2} \int_a^b f(x) dx$$

$$\text{A. } \frac{a+b}{2} \int_a^b f(b-x) dx$$

$$\text{B. } \frac{a+b}{2} \int_a^b f(b+x) dx$$

$$\text{C. } \frac{b-a}{2} \int_a^b f(x) dx$$

$$\text{D. } \frac{a+b}{2} \int_a^b f(x) dx$$

Answer: D



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24. $\int e^x (\cos x - \sin x) dx$ is equal to

$$\text{A. } e^x \cos x + c$$

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

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

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

Answer: A



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25. $\int \frac{dx}{\sin^2 x \cdot \cos^2 x}$ is equal to

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

B. $(\tan x + \cot x)^2 + c$

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

D. $(\tan x - \cot x)^2 + c$

Answer: C



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26. If $\int \frac{3e^x - 5e^{-x}}{4e^x + 5e^{-x}} dx = ax + b \ln(4e^x + 5e^{-x}) + C$, then
 $a = -\frac{1}{8}, b = \frac{7}{8}$ (b) $a = \frac{1}{8}, b = \frac{7}{8}$ $a = -\frac{1}{8}, b = -\frac{7}{8}$ (d)

$$a = \frac{1}{8}, b = -\frac{7}{8}$$

$$\text{A. } a = -\frac{1}{8}, b = \frac{7}{8}$$

$$\text{B. } a = \frac{1}{8}, b = \frac{7}{8}$$

$$\text{C. } a = \frac{-1}{8}, b = -\frac{7}{8}$$

$$\text{D. } a = \frac{1}{8}, b = -\frac{7}{8}$$

Answer: C

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27. $\int \tan^{-1} \sqrt{x} dx$ is equal to:

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

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

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

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

Answer: A

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

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

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

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

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

Answer: C

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29. $\int_{a+c}^{b+c} f(x) dx$ is equal to:

A. $\int_a^b f(x - c) dx$

B. $\int_a^b f(x + c) dx$

C. $\int_a^b f(x) dx$

D. $\int_{a-b}^{b-c} f(x) dx$

Answer: A



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30. $\int_{-1}^1 \frac{x^3 + |x| + 1}{x^2 + 2|x| + 1} dx$ is equal to

A. $\log 2$

B. $2 \log 2$

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

D. $4 \log 2$

Answer: B



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31. $\int_{-2}^2 |x \cos \pi x| dx$ is equal to:

A. $\frac{8}{\pi}$

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

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

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

Answer: A



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32. if $\int \frac{e^t dt}{1+t} = a$ then $\int e^t \frac{dt}{(1+t)^2} =$

A. $a - 1 + \frac{e}{2}$

B. $a + 1 - \frac{e}{2}$

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

D. $a + 1 + \frac{e}{2}$

Answer: B

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33. IF $x = \int_0^4 \frac{dt}{\sqrt{1+9t^2}}$ and $\frac{d^2y}{dx^2} = ay$, then a is equal to:

A. 3

B. 6

C. 9

D. 1

Answer: C



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$$34. \int \frac{dx}{\sqrt{9 - 25x^2}}$$

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

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

C. $\frac{1}{6}\sin^{-1}\left(\frac{3 + 5x}{3 - 5x}\right) + c(d)$

D. $\frac{1}{30}\log\left(\frac{3 + 5x}{3 - 5x}\right) + c$

Answer: B



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$$35. \int_0^{\pi/2} \frac{\sin^{3/2} x}{\sin^{3/2} x + \cos^{3/2} x} dx$$

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

B. 0

C. 1

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

Answer: D

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36. $\int \sin mx dx$ is:

A. $m \cos mx + c$

B. $-m \cos mx + c$

C. $-\frac{1}{m} \cos mx + c$

D. $\frac{1}{m} \cos mx + c$

Answer: C

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37. $\int \tan^2 x \, dx$

A. $x - \tan x + c$

B. $\tan x + x + c$

C. $\tan x - x + c$

D. $x \tan x + c$

Answer: C



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

A. $e^x \cos x + c$

B. $e^x \sec x + c$

C. $e^x \sin x + c$

D. $e^x \tan x + c$

Answer: B



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39. $\int \frac{1}{\sin^2 x \cos^2 x} dx$ is equal to:

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

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

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

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

Answer: B



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40. $\int_{-1}^1 \sin^5 x \cos^4 x dx$ is :

A. 1

B. -1

C. 0

D. None of these

Answer: C

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41. $\int \frac{e^x(x \log x + 1)}{x} dx$ is equal to

A. $e^x + c$

B. $e^x \log x + c$

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

D. $\log x + c$

Answer: B

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42. Evaluate: $\int e^x (f(x) + f'(x)) dx = e^x f(x) + C$

A. $e^x f'(x) + c$

B. $e^x f(x) + c$

C. $-e^x f'(x) + c$

D. $-e^x f(x) + c$

Answer: B

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43. $\int \tan^2 x dx$

A. $\tan x - x + c$

B. $\cot x - x + c$

C. $\sec x - x + c$

D. None of these

Answer: A

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44. $\int_{-\pi}^{\pi} x^3 \cos^3 x dx$ is:

A. 0

B. π

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

D. 2π

Answer: A

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45. The value of $\int_0^1 e^{x^2} x dx$ is equal to:

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

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

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

D. $\frac{1}{2}(e + 1)$

Answer: B



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46. $\int_0^a f(a - x) dx =$

A. $\int_0^{2a} f(x) dx$

B. $\int_{-a}^a f(x) dx$

C. $\int_0^a f(x) dx$

D. $\int_a^0 f(x) dx.$

Answer: C

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

A. 0

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

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

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

Answer: D

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48. $\sin 2x$

A. $\cos 2x$

B. $-\cos 2x$

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

D. $2 \cos 2x$

Answer: C

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49. The value of $\int \frac{x^2}{1+x^6} dx$ is equal to

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

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

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

D. None of these

Answer: A

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50. $\int (2x + 7)^6 dx$ is equal to:

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

B. $\frac{(2x + 7)^6}{14} + c$

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

D. $\frac{-(2x + 7)^7}{14} + c$

Answer: A

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FILL IN THE BLANKS

1. $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}} \right) dx, (x \neq 0) = \underline{\hspace{2cm}}$

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2. (i) $\int \cos ecx dx = \text{---}$

(ii) $\int \sec x dx = \text{---}$

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

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

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5. (i) $\int \tan^2 x dx = \underline{\hspace{2cm}}$

(ii) $\int \cot^2 x dx = \underline{\hspace{2cm}}$

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6. Evaluate: $\int \frac{1}{x^2 + 16} dx$

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7. (i) $\int \sqrt{a^2 - x^2} dx = \underline{\hspace{2cm}}$

(ii) $\int \sqrt{x^2 - a^2} dx = \underline{\hspace{2cm}}$

(iii) $\int \sqrt{a^2 + x^2} dx = \underline{\hspace{2cm}}$

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8. $\int (2 - x) \sin x dx = \underline{\hspace{2cm}}$



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9. Given $\int e^x (\tan x + 1) \sec x \, dx = e^x f(x) + c$ write $f(x)$ satisfying the above.

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10. $\int \frac{1}{9x^2 - 1} \, dx =$

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11. $\int_2^3 3^x \, dx = \text{---}$

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12. $\int_0^1 \frac{dx}{\sqrt{1+x^2}} = \text{---}$



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13. If $\int_0^1 (3x^2 + 2x + k) dx = 0$, find the value of k .

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14. If $f(x) = \int_0^x t \sin t dt$, then $f'(x)$ is

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15. $\int_0^{1.5} [x] dx = _ _$ where $[x]$ is greatest integer function.

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TRUE/FALSE QUESTIONS

$$1. (i) \int \tan x dx = \log|\sec x| + c$$

$$(ii) \int \cot x dx = \log|\sin x| + c$$

$$(iii) \int \tan x dx = \log|\sin x| + c$$

$$(iv) \int \tan x dx = -\log \cos x + c$$

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$$2. \text{ Prove that } \int \sec^2 x dx = \tan x + c$$

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$$3. (i) \int \sec x dx = |\log|\tan x| + c$$

$$(ii) \int \sec x dx = \log|\sec x + \tan x| + c$$

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4. Prove that $\int \frac{dx}{\sqrt{25-9x^2}} = \frac{1}{3} \sin^{-1} \left(\frac{3x}{5} \right) + c$

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

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6. Prove that $\int e^x \left(\tan^{-1} x + \frac{1}{1+x^2} \right) dx = e^x \tan^{-1} x + c$

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7. $\int e^x \left(\frac{1+x \log x}{x} \right) dx = e^x (m \log x) + c$, then m=

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8. Show that $\int \frac{1}{x^2 - 16} dx = \frac{1}{8} \log \left| \frac{x - 4}{x + 4} \right| + c$

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9. Prove that $\int_2^3 \frac{x}{x^2 + 1} dx = \log \sqrt{2}$

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10. Evaluate $\int_{0^{\frac{\pi}{2}}} \cos^2 x dx$

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VERY SHORT ANSWER TYPE QUESTIONS

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

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2. Find $\int (\cos^2 2x - \sin^2 2x) dx$

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3. Find $\int x e^{1+x^2} dx$.

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

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5. Integrate $\frac{e^{-\log x}}{x}$

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6. If $\int f(x) dx = \log|\tan x| + c$ find $f(x)$.

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7. Find: $\int \cos ex(\cos ex - \cot x) dx$

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8. $\int \frac{(\log x)^2}{x} dx.$

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9. Evaluate : $\int \frac{1}{x + x \log x} dx$

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10. Find $\int \frac{\sin(\log x)}{x} dx$

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11. Find: $\int \sin^2 x dx$

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12. Evaluate: $\int x \sqrt{x^4 + 1} dx$

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13. Evaluate: $\int x e^{2x} dx$

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14. Integration of $e^x \left(\log x + \frac{1}{x} \right) =$

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15. Evaluate: $\int_{-2}^2 (x^3 + x) dx$

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

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17. Evaluate: $\int_{-\pi/2}^{\pi/2} \sin^7 x dx$

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18. Evaluate the following integral: $\int_2^4 \frac{x}{x^2 + 1} dx$

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19. Evaluate: $\int_0^3 \frac{dx}{9 + x^2}$

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20. Evaluate each of the following integral: $\int_2^3 \frac{1}{x} dx$

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21. Evaluate: $\int_e^{e^2} \frac{dx}{x \log x}$

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22. $\int_{\pi/4}^{\pi/2} \cot^2 x dx =$

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23. Evaluate: $\int_0^{\pi/2} \frac{\cos x}{1 + \cos x + \sin x} dx$

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24. Evaluate: $\int_0^{\pi/2} e^x (\sin x - \cos x) dx$

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25. Evaluate: $\int_0^{\pi} |\cos x| dx$

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EXERCISE 7.1

1. Find an anti derivative (or integral) of the following functions by the method of inspection. $\sin 2x$

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2. Find an anti derivative (or integral) of the following functions by the method of inspection. $\cos 3x$

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3. Find an anti derivative (or integral) of the following functions by the method of inspection. e^{2x}

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4. Find an anti derivative (or integral) of the following functions by the method of inspection. $(ax + b)^2$

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5. $\sin 2x - 4e^{3x}$

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

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7. Find the following integrals :

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

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8. $\int(ax^2 + bx + c) dx$

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9. Find the following integrals :

$$\int(2x^2 + e^x) dx$$

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10. Find the following integrals :

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

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11. Find the integral $\int\frac{x^3 + 5x^2 - 4}{x^2} dx$

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12. Evaluate the following integrals.

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

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13. Find the following integrals :

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

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14. Find the following integrals :

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

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15. Find the integral $\int \sqrt{x}(3x^2 + 2x + 3) dx$

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16. Integrate the functions $\frac{1}{\sqrt{x^2 + 2x + 2}}$

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17. Integrate the functions $\frac{1}{9x^2 + 6x + 5}$

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18. Evaluate: $\int \frac{1}{\sqrt{7 - 6x - x^2}} dx$

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19. Integrate the functions $\frac{1}{\sqrt{(x-a)(x-b)}}$

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20. Evaluate: $\int \frac{1}{\sqrt{8+3x-x^2}} dx$

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21. Integrate the functions $\frac{1}{\sqrt{(x-a)(x-b)}}$

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22. Integrate the functions $\frac{4x+1}{\sqrt{2x^2+x-3}}$

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23. Evaluate: $\int \frac{x + 2}{\sqrt{x^2 - 1}} dx$

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24. Integrate the functions $\frac{5x - 2}{1 + 2x + 3x^2}$

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25. Evaluate : $\int \frac{6x + 7}{\sqrt{(x - 5)(x - 4)}} dx$

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26. Evaluate :

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

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27. Evaluate: $\int \frac{x + 2}{\sqrt{x^2 + 2x + 3}} dx$

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28. Integrate the functions $\frac{x + 3}{x^2 - 2x - 5}$

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29. Integrate the functions $\frac{5x + 3}{\sqrt{x^2 + 4x + 10}}$

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EXERCISE 7.5

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

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2. Integrate the rational functions $\frac{1}{x^2 - 9}$

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

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4. $\frac{x}{(x - 1)(x - 2)(x - 3)}$

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5. Integrate the rational functions $\frac{2x}{x^2 + 3x + 2}$

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6. Integrate $\frac{1 - x^2}{x(1 - 2x)}$

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

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

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

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

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11. Evaluate: $\int \frac{5x}{(x + 1)(x^2 - 4)} dx$

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

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

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14. Integrate the rational functions $\frac{3x - 1}{(x + 2)^2}$

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15. $\frac{1}{x^4 - 1}$

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16. $\int \frac{1}{x(x^n + 1)}$

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17. Evaluate $\int \frac{\cos x}{(1 - \sin x)(2 - \sin x)} dx$.

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

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19. Integrate the rational functions $\frac{2x}{(x^2 + 1)(x^2 + 3)}$

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20. Evaluate: $\int \frac{1}{x(x^4 + 1)} dx$

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21. $\frac{1}{(e^x - 1)}$

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22. $\int \frac{x dx}{(x-1)(x-2)}$ equals:

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

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

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

D.

Answer: B

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23. $\int \frac{dx}{x(x^2+1)}$ equal(A) $\log|x| - \frac{1}{2}\log(x^2+1) + C$ (B)

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

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

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

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

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

D.

Answer: A

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EXERCISE 7.6

1. integrate the function $x \sin x$

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2. Evaluate $\int x \sin 3x dx$.

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3. Integrate $x^2 e^x$

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4. Integrate $x \log x$

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5. $x \log 2x$

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6. Integrate the functions $x^2 \log x$

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7. Integrate the functions $x \sin^{-1} x$

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8. $\int (x \tan^{-1} x dx)$

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9. Integrate $x \cos^{-1} x$

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10. Integrate the functions $(\sin^{-1} x)^2$

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

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12. $\int x \sec^2 x dx$

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13. Integrate $\tan^{-1} x$

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14. Integrate $x(\log x)^2$

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15. Integrate the functions $(x^2 + 1)\log x$

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16. Integrate the function $e^x(\sin x + \cos x)$

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

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18. Integrate the function $e^x \left(\frac{1 + \sin x}{1 + \cos x} \right)$

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19. Evaluate: $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$

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20. Integrate the functions $\frac{(x - 3)e^x}{(x - 1)^3}$

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21. Evaluate: $\int e^{2x} \sin x dx$

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22. If $x \in [-1, 1]$ then $\frac{\sin^{-1}(2x)}{1 + x^2}$ equals

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EXERCISE 7.7

1. Evaluate: $\sqrt{4 - x^2}$

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2. Integrate the functions $\sqrt{1 - 4x^2}$

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3. Integrate the functions $\sqrt{x^2 + 4x + 6}$

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4. Integrate the functions $\sqrt{x^2 + 4x + 1}$

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5. Integrate the functions $\sqrt{1 - 4x - x^2}$

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6. Integrate the functions $\sqrt{x^2 + 4x - 5}$

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7. Integrate the functions $\sqrt{1 + 3x - x^2}$

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8. Integrate the functions $\sqrt{x^2 + 3x}$

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9. Integrate the functions $\sqrt{1 + \frac{x^2}{9}}$

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EXERCISE 7.8

1. $\int_m^n x dx$

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2. $\int_0^5 (x + 1) dx$

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3. $\int_{-2}^3 x^2 dx$

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$$4. \int_1^4 (x^2 - x) dx$$

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$$5. \int_{-1}^1 e^x dx$$

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$$6. \int_0^4 (x + e^{2x}) dx$$

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$$7. \int_0^2 x\sqrt{2-x} dx$$

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8. The value of $\int_0^{\pi/2} (2 \log \sin x - \log \sin 2x) dx$, is

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9. $\int_{-\pi/2}^{\pi/2} \sin^2 x dx$

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10. Evaluate: $\int_0^{\pi} \frac{x}{1 + \sin x} dx$

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11. Evaluate: $\int_{-\pi/2}^{\pi/2} \sin^7 x dx$

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12. Evaluate: $\int_0^{2\pi} \cos^5 x \, dx$

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13. $\int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$

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14. Evaluate: $\int_0^{\pi} \log(1 + \cos x) dx$

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15. Evaluate the following :

$$\int_0^a \frac{\sqrt{x}}{\sqrt{x} + \sqrt{a-x}} dx$$

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16. Evaluate the following integral: $\int_0^4 |x - 1| dx$

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17. Show that $\int_0^a f(x)g(x)dx = 2\int_0^a f(x)dx$ if f and g defined as $f(x) = f(a - x)$ and $g(x) + g(a - x) = 4$

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MISCELLANEOUS EXERCISE ON CHAPTER 7

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

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2. Integrate the functions $\frac{1}{\sqrt{x+a} + \sqrt{x+b}}$

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3. $\frac{1}{x\sqrt{ax-x^2}}$ [Hint : Put $x = \frac{a}{t}$]

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

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

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6. Evaluate $\int \frac{5x}{(x+1)(x^2+9)} dx$

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7. Integrate the functions $\frac{\sin x}{\sin(x - a)}$

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8. Evaluate: $\int \frac{e^{5 (\log)_e x} - e^{4 (\log)_e x}}{e^{3 (\log)_e x} - e^{2 (\log)_e x}} dx$

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9. $\int \frac{\cos x}{\sqrt{4 - \sin^2 x}} dx$

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

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$$11. \int \frac{1}{\cos(x+a)\cos(x+b)} dx$$

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$$12. \int \frac{x^3}{\sqrt{1-x^8}} dx$$

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

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$$14. \text{Evaluate: } \int \frac{1}{(x^2+1)(x^2+4)} dx$$

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15. $\cos^3 x e^{\log \sin x}$

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16. Evaluate: $\int e^{3 \log x} (x^4 + 1)^{-1} dx$

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17. Integrate the functions $f'(ax + b)[f(ax + b)]^n$

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18. Integrate the functions $\frac{1}{\sqrt{\sin^3 x \sin(x + \alpha)}}$

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19. Integrate the functions $\frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}}, x \in [0, 1]$

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

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21. $\frac{2 + \sin 2x}{1 + \cos 2x} e^x$

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

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23. Integrate the function $\tan^{-1} \sqrt{\frac{1-x}{1+x}}$

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24. Integrate the functions $\frac{\sqrt{x^2+1} [\log(x^2+1) - 2\log x]}{x^4}$

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25. Evaluate the following :

$$\int_{\pi/2}^{\pi} e^x \left(\frac{1 - \sin x}{1 - \cos x} \right) dx.$$

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26. Evaluate: $\int_0^{\pi/4} \frac{\sin 2x}{\cos^4 x + \sin^4 x} dx$

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27. Evaluate: $\int_0^{\pi/2} \frac{\cos^2 x}{\cos^2 x + 4 \sin^2 x} dx$

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28. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx$

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

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

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31. Evaluate:

$$\int_0^{\frac{\pi}{2}} (\sin 2x \tan^{-1}(\sin x)) dx$$

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32. Evaluate: $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$

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33. Evaluate $\int_1^4 f(x) dx$, where $f(x) = |x - 1| + |x - 2| + |x - 3|$

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34. $\int_1^3 \frac{dx}{x^2(x+1)} = \frac{2}{3} + \log \frac{2}{3}$

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35. Evaluate: $\int_0^1 x e^x dx$

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

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37. $\int_0^\pi \sin 3x dx = \frac{2}{3}$

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38. $\int_0^{\frac{\pi}{4}} 2 \tan^3 x dx = 1 - \log 2$

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$$39. \int_0^1 \sin^{-1} x dx = \frac{\pi}{2} - 1$$

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40. Evaluate $\int_0^1 e^{2-3x} dx$ as a limit of a sum.

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41. Choose the correct answers $\int \frac{dx}{e^x + e^{-x}}$ is equal to (A) $\tan^{-1}(e^x) + C$ (B) $\tan^{-1}(e^{-x}) + C$ (C) $\log(e^x - e^{-x}) + C$ (D) $\log(e^x + e^{-x}) + C$

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

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

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

D. $\log(e^x + e^{-x}) + c$

Answer: A

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42. If $f(a + b - x) = f(x)$, then $\int_a^b x f(x) dx$ is equal to (A) $\frac{a-b}{2} \int_a^b f(a+b-x) dx$ (B) $\frac{a+b}{2} \int_a^b f(b-x) dx$ (C) $\frac{a+b}{2} \int_a^b f(x) dx$ (D) $\frac{b-a}{2} \int_a^b f(x) dx$

A. $\frac{a+b}{2} \int_a^b f(b-x) dx$

B. $\frac{a+b}{2} \int_a^b f(b+x) dx$

C. $\frac{b-a}{2} \int_a^b f(x) dx$

D. $\frac{a+b}{2} \int_a^b f(x) dx$

Answer: D

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43. The value of $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx$, is 1 b. -1 c. 0 d. $\pi/4$

A. 1

B. 0

C. -1

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

Answer: B

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QUESTION FROM NCERT EXAMPLAR

1. Verify the following using the concept of integration as an antiderivative.

$$\int \frac{x^3}{x+1} dx = x - \frac{x^2}{2} + \frac{x^3}{3} - \log|x+1| + C$$

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2.
$$\int \frac{dx}{\sqrt{(x-a)(b-x)}}$$

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3. Evaluate:
$$\int \tan^8 x \sec^4 x dx$$

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4. Evaluate:
$$\int \frac{x^3 + x}{x^4 - 9} dx$$

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

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6. Find: $\int_0^1 x (\tan^{-1} x)^2 dx$

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EXERCISE

1. $\int \frac{3ax}{b^2 + c^2x^2} dx$

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

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



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

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5. Evaluate: $\int \frac{\sin^{-1} x}{(1-x^2)^{3/2}} dx$

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6. Evaluate the following integrals:

$$\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx$$

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7. $\int \frac{\sqrt{x}}{\sqrt{a^3-x^3}} dx$ equal to

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8.
$$\int_{\pi/3}^{\pi/2} \frac{\sqrt{1 + \cos x}}{(1 - \cos x)^{5/2}} dx$$

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9. Evaluate:
$$\int_{\pi/4}^{\pi/4} \log(\sin x + \cos x) dx$$

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10. Evaluate the following integrals:
$$\int_0^{\pi/2} \frac{\tan x}{1 + m^2 \tan^2 x} dx$$

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REVISION EXERCISE

1. Evaluate: $\int \sqrt{\sec x - 1} dx$

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2. $\int \frac{2 \sin 2\theta - \cos \theta}{6 - \cos^2 \theta - 4 \sin \theta} d\theta$

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3. $\int \frac{x^8}{(1 + x^3)^{1/3}} dx$

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

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

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6. $\int \frac{\tan \theta d\theta}{1 - \sin \theta}$

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

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8. $\int \frac{dx}{\sin^3 x \cos^5 x}$

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9. Evaluate: $\int \sqrt{\frac{a+x}{x}} dx$

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10. $\int_0^{\pi/2} (\sqrt{\tan x} + \sqrt{\cot x}) dx$

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11. $\int_0^{\pi} \frac{\sqrt{1+\cos x}}{(1-\cos x)^{5/2}} dx$

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12. $\int \cos \left(2 \cot^{-1} \sqrt{\frac{1-x}{1+x}} \right) dx$

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

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14. $\int \frac{\sqrt{\cos x}}{\sin x} dx$

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15. (i) $\int \frac{1}{\cos^4 x + \sin^4 x} dx$
(ii) $\int \frac{1}{\sin^4 x + \sin^2 x \cos^2 x + \cos^4 x} dx$

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16. $\int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}}$

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17. Evaluate: $\int \frac{\sqrt{\cos 2x}}{\sin x} dx$

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

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19. $\int_2^5 (x^2 + x) dx$

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20. $\int_0^2 x\sqrt{2-x} dx$

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21. $\int_0^{2\pi} |\cos x| dx = 4$

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22. $\int_0^{\pi/2} \log(\tan x + \cot x) dx = \pi(\log 2)$

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23. Prove that

$$\int_0^{\pi/2} \frac{\sin x \cos x}{a^2 \sin^2 x + b^2 \cos^2 x} dx = \frac{1}{a^2 - b^2} \log\left(\frac{a}{b}\right).$$

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24. Evaluate: $\int_0^{\pi/2} \sqrt{\cos \theta} \sin^3 \theta d\theta$

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25. $\int_0^{\pi/4} (\sqrt{\tan x} + \sqrt{\cot x}) dx$ equals

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26. Evaluate: $\int_0^1 \frac{1}{\sqrt{1+x} - \sqrt{x}} dx$

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27. Evaluate:

$$\int_0^{\frac{\pi}{2}} (\sin 2x \tan^{-1}(\sin x)) dx$$

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28. Evaluate: $\int_0^{\pi/2} \frac{\cos^2 x}{\cos^2 x + 4 \sin^2 x} dx$

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CHECK YOUR UNDERSTANDING

1. If $f'(x) = x - \frac{3}{x^2}$, $f(1) = \frac{11}{2}$, then $f(x) = \dots\dots$

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2. $\int \tan x dx = -\log|\cos x| + c$

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3. $\int \cos ec^2 x dx = -\cot x$

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4. $\int \sqrt{a^2 - x^2} dx =$

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5. Evaluate: $\int e^x (\cot x - \operatorname{cosec}^2 x) dx$

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6. Which of the following is wrong?

A. $\int \sqrt{x^2 - a^2} dx = \frac{x}{2} \sqrt{x^2 - a^2} + \frac{a^2}{2} \log|x + \sqrt{x^2 + a^2}| + c$

B. $\int \sqrt{x^2 + a^2} dx = \frac{x}{2} \sqrt{x^2 + a^2} + \frac{a^2}{2} \log|x + \sqrt{x^2 + a^2}| + c$

C. $\int \frac{1}{\sqrt{x^2 + a^2}} dx = \log|x + \sqrt{x^2 + a^2}| + c$

D. $\int \frac{1}{\sqrt{x^2 - a^2}} dx = \log|x + \sqrt{x^2 - a^2}| + c$

Answer: A

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7. Evaluate: $\int_0^1 x e^x dx$

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8. Evaluate $\int_{-1}^1 |x| dx$

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9. If $f(x) = \int_0^x t \sin t dt$, then write the value of $f'(x)$

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10. $\int_{-1}^1 x^{17} \cos^4 x dx = 0$

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COMPETITION FILE

1. Let $I = \int_0^1 \frac{\sin x}{\sqrt{x}} dx$ and $J = \int_0^1 \frac{\cos x}{\sqrt{x}} dx$. Then which of the following is true?

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

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

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

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

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

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

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

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

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

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3. $\int_0^{\pi} [\cot x] dx$, where $[.]$ denotes the greatest integer function, is equal to

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

B. 1

C. -1

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

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4. Let $p(x)$ be a function defined on R such that $p'(x) = p'(1 - x)$ for all $x \in [0, 1]$, $p(0) = 1$, and $p(1) = 41$.

Then $\int_0^1 p(x) dx$ is equal to

A. $\sqrt{41}$

B. 21

C. 41

D. 42

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5. The value of $\int_0^1 \frac{8 \log(1+x)}{1+x^2} dx$ is:

A. $\pi \log 2$

B. $\frac{\pi}{8} \log 2$

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

D. $\log 2$

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6. For $x \in \left(0, \frac{5\pi}{2}\right)$, definite $f(x) = \int_0^x \sqrt{t} \sin t dt$. Then f has

A. local maximum at π and 2π

B. local minimum at π and 2π

C. local minimum at π and local maximum at 2π

D. local maximum at π and local minimum at 2π

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7. Let $[\]$ denote the greatest integer function then the value

$$\int_0^{1.5} x [x^2] \cdot dx$$

A. 0

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

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

D. $\frac{5}{9}$



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8. 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

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9. If $g(x) = \int_0^x \cos^4 t dt$, then $g(x + \pi)$ equals

A. $\frac{q(x)}{q(\pi)}$

B. $q(x) + q(\pi)$

C. $q(x) - q(\pi)$

D. $q(x) \cdot q(\pi)$

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

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

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

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

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

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11. The intercepts on x-axis made by tangents to the curve,

$$y = \int_0^x |t| dt, x \in \mathbb{R},$$

which are parallel to the line $y = 2x$, are

equal to (1) ± 2 (2) ± 3 (3) ± 4 (4) ± 1

A. ± 2

B. ± 3

C. ± 4

D. ± 1

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

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

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

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

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

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13. The integral $\int_0^\pi \sqrt{1 + 4\sin^2 \frac{x}{2} - 4\sin \frac{x}{2}} dx$ is equal to

A. $\frac{2\pi}{3} - 4 - 4\sqrt{3}$

B. $4\sqrt{3} - 4$

C. $4\sqrt{3} - 4 - \frac{\pi}{3}$

D. $\pi - 4$



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

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

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

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

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



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15. The integral $\int_2^4 \frac{\log x^2}{\log x^2 + \log(36 - 12x + x^2)} dx$ is equal to: (1) 2

(2) 4 (3) 1 (4) 6

A. 2

B. 4

C. 1

D. 6



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

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

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

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

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

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17. $\lim_{n \rightarrow \infty} \left[\frac{(n+1)(n+2)\dots 3n}{n^{2n}} \right]^{1/n}$ is equal to

A. $\frac{27}{e^2}$

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

C. $3 \log 3 - 2$

D. $\frac{18}{e^4}$

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18. $\int_{\pi/4}^{3\pi/4} \frac{dx}{1 + \cos x}$ is equal to

A. 4

B. -1

C. -2

D. 2

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19. Let $I_n = \int \tan^n x dx$, ($n > 1$). If $I_4 + I_6 = a \tan^5 x + bx^5 + C$,

Where C is a constant of integration, then the ordered pair (a, b) is equal to :

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

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

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

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

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20. The integral

$$\int \frac{\sin^2 x \cos^2 x}{(\sin^5 x + \cos^3 x \sin^2 x + \sin^3 x \cos^2 x + \cos^5 x)^2} dx \text{ is equal to}$$

(where c is a constant of integration)

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

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

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

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

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21. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\sin^2 x}{1 + 2^x} dx$ is: (A) π (B) $\frac{\pi}{2}$ (C) 4π (D) $\frac{\pi}{4}$

A. $\frac{\pi}{8}$

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

C. 4π

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

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22. Let f and g be continuous functions on $[0, a]$ such that

$f(x) = f(a - x)$ and $g(x) + g(a - x) = 4$ then $\int_0^a f(x)g(x) dx$

is equal to

A. $\int_0^a f(x) dx$

B. $4 \int_0^a f(x) dx$

C. $-3 \int_0^a f(x) dx$

D. $2 \int_0^a f(x) dx$

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23. The integral $\int \cos(\log_e x) dx$ is equal to (where C is constant of integration):

A. $x [\cos(\log_e x) - \sin(\log_e x)] + c$

B. $\frac{x}{2} [\cos(\log_e x) + \sin(\log_e x)] + c$

C. $\frac{x}{2} [\sin(\log_e x) + \cos(\log_e x)] + c$

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

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24. The integral $\int \sec^{2/3} x \operatorname{cosec}^{4/3} x \, dx$ is equal to (here C is a constant of integration)

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

B. $-3 \cot^{1/3} x + c$

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

D. $\frac{3}{4} \cot^{1/3} x + c$



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