



## MATHS

### NCERT - NCERT MATHEMATICS(HINGLISH)

## INTEGRALS

#### Exercise 7.11

1. Choose the correct answer. The value of  $\int_0^{\frac{\pi}{2}} \log\left(\frac{4 + 3 \sin x}{4 + 3 \cos x}\right) dx$

A. 2

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

C. 0

D. -2

**Answer: C**



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2. By using the properties of definite integrals, evaluate the integrals

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



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3. By using the properties of definite integrals, evaluate the integrals

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^7 x dx$$



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4. By using the properties of definite integrals, evaluate the integrals

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



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5. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\pi} \log(1 + \cos x) dx$$

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6. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{2\pi} \cos^5 x dx$$

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7. By using the properties of definite integrals, evaluate the integrals

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

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8. By using the properties of definite integrals, evaluate the integrals

$$\int_0^a \frac{\sqrt{x}}{\sqrt{x} + \sqrt{a-x}} dx$$

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9. Choose the correct answer The Value of

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (x^3 + x \cos x + \tan^5 x + 1) dx \text{ is}$$

(A) 0 (B) 2 (C)  $\pi$  (D) 1

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10. Show that  $\int_0^a f(x)g(x)dx = 2\int_0^a f(x)dx$  if  $f$  and  $g$  defined as

$$f(x) = f(a-x) \text{ and } g(x) + g(a-x) = 4$$

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11. By using the properties of definite integrals, evaluate the integrals

$$\int_0^4 |x - 1| dx$$

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12. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} \cos^2 x dx$$

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13. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$$

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14. By using the properties of definite integrals, evaluate the integrals

$$\int_0^2 x\sqrt{2-x} dx$$

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15. By using the properties of definite integral, evaluate the integrals

$$\int_2^8 |x-5| dx$$

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16. By using the properties of definite integrals, evaluate the integrals

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

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17. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} \frac{\cos^5 x dx}{\sin^5 x + \cos^5 x}$$

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18. By using the properties of definite integrals, evaluate the integrals

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

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19. By using the properties of definite integrals, evaluate the integrals

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

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20. By using the properties of definite integrals, evaluate the integrals

$$\int_{-5}^5 |x + 2| dx$$

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### Exercise 7 9

1. Evaluate the definite integrals  $\int_0^1 \frac{2x + 3}{5x^2 + 1} dx$

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2. Evaluate the definite integrals  $\int_0^1 x e^{x^2} dx$

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3. Evaluate the definite integrals

$$\int_1^2 \frac{5x^2}{x^2 + 4x + 3}$$

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4. Evaluate the definite integrals  $\int_0^{\frac{\pi}{4}} (2 \sec^2 x + x^3 + 2) dx$

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5. Evaluate the definite integrals  $\int_0^1 \frac{dx}{1 + x^2}$

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

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

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

D. 0

**Answer: B**

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6. Evaluate the definite integrals  $\int_2^3 \frac{dx}{x^2 - 1}$

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7. Evaluate the definite integrals  $\int_0^{\frac{\pi}{2}} \cos^2 x dx$

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8. Evaluate the definite integrals  $\int_2^3 \frac{x dx}{x^2 + 1}$

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9. Evaluate the definite integrals  $\int_0^{\pi} \left( \sin^2\left(\frac{x}{2}\right) - \cos^2\left(\frac{x}{2}\right) \right) dx$

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10. Evaluate the definite integrals  $\int_0^2 \frac{6x + 3}{x^2 + 4} dx$

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11. Choose the correct answer  $\int_1^{\sqrt{3}} \frac{dx}{1 + x^2}$  equals

- (A)  $\frac{\pi}{3}$
- (B)  $\frac{2\pi}{3}$
- (C)  $\frac{\pi}{6}$
- (D)  $\frac{\pi}{12}$

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12. Evaluate the definite integrals  $\int_0^1 \left( xe^x + \frac{\sin(\pi x)}{4} \right) dx$

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13. Choose the correct answer  $\int_0^{\frac{2}{3}} \frac{dx}{4 + 9x^2}$  (A)  $\frac{\pi}{6}$  (B)  $\frac{\pi}{12}$  (C)  $\frac{\pi}{24}$  (D)  $\frac{\pi}{4}$

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14. Evaluate the definite integrals  $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$

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15. Evaluate the definite integrals  $\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \cos ecx dx$

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16. Evaluate the definite integrals  $\int_1^2 (4x^3 - 5x^2 + 6x + 9) dx$

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17. Evaluate the definite integrals  $\int_2^3 \frac{1}{x} dx$

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18. Evaluate the definite integrals  $\int_{-1}^1 (x + 1) dx$

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19. Evaluate the definite integrals  $\int_0^{\frac{\pi}{4}} (\tan x) dx$

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20. Evaluate the definite integrals  $\int_4^5 e^x dx$

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21. Evaluate the definite integrals  $\int_0^{\frac{\pi}{2}} \cos 2x dx$

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22. Evaluate the definite integrals  $\int_0^{\frac{\pi}{4}} \sin 2x dx$

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## Exercise 7 6

1. Integrate the function  $x \log 2x$

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2. Integrate the function  $x^2 \log x$

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3. Integrate the function  $x \sin^{-1} x$

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4. Integrate the function  $x \log x$

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5. Integrate the function  $x \sin x$

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6. Integrate the function  $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$

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

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8. Integrate the function  $\frac{(x-3)e^x}{(x-1)^3}$

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9. Integrate the function  $e^{2x} \sin x$

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10. Integrate the function  $e^x \left( \frac{1}{x} - \frac{1}{x^2} \right)$

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11. Integrate the function  $e^x \left( \frac{1 + \sin x}{1 + \cos x} \right)$

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12. Integrate the function  $(x^2 + 1)\log x$

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13. Integrate the function

$$x(\log x)^2$$

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14. Integrate the function  $\frac{xe^x}{(1+x)^2}$

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15. Integrate the function  $e^x(\sin x + \cos x)$

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16. Integrate the function  $\frac{x \cos^{-1} x}{\sqrt{1-x^2}}$

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17. Integrate the function  $(\sin^{-1} x)^2$

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18. Integrate the function  $\tan^{-1} x$

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19. Integrate the function  $x \sec^2 x$

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20. Integrate the function  $x \tan^{-1} x$

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21. Integrate the function  $x \cos^{-1} x$

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22. Integrate the function  $x \sin 3x$

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23. Integrate the function  $x^2 e^x$

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24. Choose the correct answer  $\int e^x \sec x (1 + \tan x) dx$

(A)  $e^x \cos x + C$  (B)  $e^x \sec x + C$  (C)  $e^x \sin x + C$  (D)  $e^x \tan x + C$

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## Exercise 7 10

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

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

B. 0

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

D. None of these

**Answer: A**

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

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3. Evaluate the integrals  $\int_0^2 \frac{dx}{x + 4 - x^2}$

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4. Evaluate:  $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$

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5. The value of the integral

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

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6. Evaluate the integrals  $\int_0^2 x\sqrt{x+2}$

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7. Choose the correct answer .If  $f(x) = \int_0^x t \sin t dt$ , then  $f'(x)$  is

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

B. (B)  $x \sin x$

C. (C)  $x \cos x$

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

**Answer: B**

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8. Evaluate the integrals  $\int_0^1 \frac{x}{x^2 + 1} dx$

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9. Evaluate the integrals  $\int_0^{\frac{\pi}{2}} \sqrt{\sin \phi} \cos^5 \phi d\phi$

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10. Evaluate the integrals  $\int_1^2 \left( \frac{1}{x} - \frac{1}{2x^2} \right) e^{2x} dx$

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## Exercise 7 7

1. Integrate the functions  $\sqrt{x^2 + 4x + 6}$

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2. Integrate the functions  $\sqrt{1 - 4x - x^2}$

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3. Integrate the functions  $\sqrt{x^2 + 4x + 1}$

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4. Integrate the functions

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

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5. Integrate the functions  $\sqrt{x^2 + 4x - 5}$

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6. Integrate the functions  $\sqrt{4 - x^2}$

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7. Integrate the functions  $\sqrt{1 - 4x^2}$

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8. Integrate the functions  $\sqrt{1 + \frac{x^2}{9}}$

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9. Integrate the functions  $\sqrt{x^2 + 3x}$

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10. Choose the correct answer

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

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

Answer: A



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11. 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.

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

Answer: D



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12. Integrate the function  $(x + 3)\sqrt{3 - 4x - x^2}$

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13. Integrate:  $\int x\sqrt{x + x^2} dx$

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14. Integrate  $(x + 1)\sqrt{2x^2 + 3}$

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## Exercise 7 5

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

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

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2. Integrate the rational functions  $\frac{1}{x(x^4 - 1)}$

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

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

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

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

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

**Answer: B**

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4. Integrate the rational functions  $\frac{1}{(e^x - 1)}$  [Hint : Put  $e^x = t$ ]

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5. Integrate the rational functions  $\frac{3x + 5}{x^3 - x^2 - x + 1}$

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6. Integrate the rational functions  $\frac{x}{(x - 1)^2(x + 2)}$

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7. Integrate the rational functions  $\frac{x}{(x^2 + 1)(x - 1)}$

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8. Integrate the rational functions  $\frac{1 - x^2}{x(1 - 2x)}$

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9. Integrate the rational functions  $\frac{2x}{x^2 + 3x + 2}$

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10. Integrate the rational functions  $\frac{x}{(x - 1)(x - 2)(x - 3)}$

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11. Integrate the rational functions  $\frac{3x - 1}{(x - 1)(x - 2)(x - 3)}$

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12. Integrate the rational functions  $\frac{1}{x^2 - 9}$

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13. Integrate the rational functions  $\frac{x}{(x + 1)(x + 2)}$

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14. Integrate the rational functions  $\frac{(x^2 + 1)(x^2 + 2)}{(x^2 + 3)(x^2 + 4)}$

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15. Integrate the rational functions  $\frac{2x}{(x^2 + 1)(x^2 + 3)}$

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16. Integrate the rational functions  $\frac{2x - 3}{(x^2 - 1)(2x - 4)}$

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17. Integrate the rational functions  $\frac{5x}{(x + 1)(x^2 - 4)}$

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18. Integrate the rational functions  $\frac{x^3 + x + 1}{x^2 - 1}$

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19. Integrate the rational functions  $\frac{2}{(1 - x)(1 + x^2)}$

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20. Integrate the rational functions  $\frac{3x - 1}{(x + 2)^2}$

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21. Integrate the rational functions  $\frac{1}{x^4 - 1}$

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22. Integrate the rational functions  $\frac{1}{x(x^n + 1)}$  [Hint: multiply numerator and denominator by  $x^{n-1}$  and put  $x^n = t$ ]

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23. Integrate the rational functions  $\frac{\cos x}{(1 - \sin x)(2 - \sin x)}$  [Hint: Put  $\sin x = t$ ]

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## Miscellaneous Exercise

1. Integrate the functions  $\frac{x^3}{\sqrt{1-x^8}}$

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2. Integrate the functions  $\cos^3 x e^{\log \sin x}$

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3. Integrate the functions  $\frac{1}{\cos(x-a)\cos(x-b)}$

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4. Integrate the functions  $\frac{\sin^8 x - \cos^8 x}{1 - 2 \sin^2 x \cos^2 x}$

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5. Integrate the functions  $\frac{\cos x}{\sqrt{4 - \sin^2 x}}$

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6. Integrate the functions  $\frac{e^{5 \log x} - e^{4 \log x}}{e^{2 \log x} - e^{2 \log x}}$

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7. Integrate the functions  $\frac{1}{x - x^3}$

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8. Integrate the functions  $e^{3 \log x} (x^4 + 1)^{-1}$

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9. Integrate the functions  $\frac{1}{x\sqrt{ax-x^2}}$

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10. Integrate the functions  $\frac{1}{\sqrt{\sin^3 x \sin(x + \alpha)}}$

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11. 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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12. Prove that  $\int_{-1}^1 x^{17} \cos^4 x dx = 0$

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

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14. Integrate the functions  $\frac{5x}{(x+1)(x^2+9)}$

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15. Integrate the functions  $\frac{1}{(x^2+1)(x^2+4)}$

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16. Integrate the functions  $\frac{e^x}{(1+e^x)(2+e^x)}$

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17. Integrate the functions  $\frac{1}{\sqrt{(x+a)(x+b)}}$

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18. Evaluate the definite integrals  $\int_0^1 \frac{dx}{\sqrt{1+x} - \sqrt{x}}$

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19. Evaluate the definite integrals  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx$

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20. Evaluate the definite integrals  $\int_0^{\frac{\pi}{2}} \frac{\cos^2 x dx}{\cos^2 x + 4 \sin^2 x}$

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21. Evaluate the definite integrals  $\int_0^{\frac{\pi}{4}} \frac{\sin x \cos x}{\cos^4 x + \sin^4 x} dx$

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22. Evaluate the definite integrals

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

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23. Integrate the functions  $\frac{\sqrt{x^2 + 1} [\log(x^2 + 1) - 2 \log x]}{x^4}$

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24. Integrate the function  $\tan^{-1} \sqrt{\frac{1-x}{1+x}}$

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25. Integrate the functions  $\frac{x^2 + x + 1}{(x + 1)^2(x + 2)}$

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26. Integrate the functions  $\frac{2 + \sin 2x}{1 + \cos 2x} e^x$

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27. Integrate the functions  $\sqrt{\frac{1 - \sqrt{x}}{1 + \sqrt{x}}}$

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28. Evaluate the definite integrals  $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$

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29. Evaluate the definite integrals  $\int_0^{\frac{\pi}{2}} \sin 2x \tan^{-1}(\sin x) dx$

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30. Choose the correct answers  $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$  is equal (A)  $\frac{-1}{\sin x + \cos x} + C$  (B)  $\log|\sin x + \cos x| + C$  (C)  $\log|\sin x - \cos x| + C$  (D)  $\frac{1}{(\sin x + \cos x)^2}$

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31. Evaluate the definite integrals  $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$

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32. Evaluate the definite integrals  $\int_1^4 [ |x - 1| + |x - 2| + |x - 3| ] dx$

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33. Prove that  $\int_1^3 \frac{dx}{x^2(x+1)} = \frac{2}{3} + \frac{\log 2}{3}$

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34. Prove that  $\int_0^1 x e^x dx = 1$

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35. Prove that  $\int_0^{\frac{\pi}{4}} 2 \tan^3 x dx = 1 - \log 2$

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36. Prove that  $\int_0^{\frac{\pi}{2}} \sin^3 x dx = \frac{2}{3}$

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37. Integrate the functions  $\frac{\sin x}{\sin(x - a)}$

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38. Integrate the functions  $\frac{1}{x^{\frac{1}{2}} + x^{\frac{1}{3}}}$  [Hint:  $\frac{1}{x^{\frac{1}{2}} + x^{\frac{1}{3}}} = \frac{1}{x^{\frac{1}{3}}(1 + x^{\frac{1}{6}})}$

, put  $x = t^6$ ]

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39. Integrate the functions  $\frac{1}{x^2(x^4 + 1)^{\frac{3}{4}}}$

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40. The value of  $\int_0^1 \tan^{-1}\left(\frac{2x - 1}{1 + x - x^2}\right) dx$  is (A) 1 (B) 0 (C) -1 (D)  $\frac{\pi}{4}$

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

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

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43. Integrate the functions  $f'(ax + b)[f(ax + b)]^n$

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44. Evaluate  $\int_0^1 e^{2-3x} dx$  as a limit of a sum.

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### Exercise 7 3

1. Integrate the functions  $\frac{\cos 2x + 2 \sin^2 x}{\cos^2 x}$

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2. Integrate the functions  $\frac{1}{\sin x \cos^3 x}$

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3. Integrate the functions  $\frac{\sin^2 x}{1 + \cos x}$

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4. Integrate the functions  $\frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha}$

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5. Integrate the functions  $\sin^4 x$

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6. Integrate the functions  $\cos^4 2x$

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7. Integrate the functions  $\tan^4 x$

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8. Integrate the functions  $\frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x}$

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9. Integrate the functions  $\frac{\cos x - \sin x}{1 + \sin 2x}$

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10. Integrate the functions  $\tan^3 2x \sec 2x$

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11.  $\int \frac{e^x(1+x)}{\cos^2(e^x \cdot x)} dx$  equals

A. (A)  $-\cot(e^x \cdot x) + C$

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

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

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

**Answer: B**

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

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

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

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

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

**Answer: A**

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13. Integrate the functions  $\frac{1}{\cos(x - a)\cos(x - b)}$

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14. Integrate the functions  $\sin^{-1}(\cos x)$

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15. Integrate the functions  $\frac{\cos 2x}{(\cos x + \sin x)^2}$

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16. Find the integrals of the function  $\sin^2(2x + 5)$

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17. Integrate the functions  $\frac{\cos x}{1 + \cos x}$

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18. Integrate the functions  $\frac{1 - \cos x}{1 + \cos x}$

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19. Find the integrals of the functions  $\cos 2x \cos 4x \cos 6x$

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20. Find the integrals of the functions  $\sin 3x \cos 4x$

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21. Integrate the functions  $\sin^3 x \cos^3 x$

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22. Find the integrals of the functions  $\sin^3(2x + 1)$

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23. Integrate the functions  $\sin 4x \sin 8x$

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24. Integrate the functions  $\sin x \sin 2x \sin 3x$

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## Solved Examples

1. Evaluate  $\int_{-1}^1 5x^4 \sqrt{x^5 + 1} dx$

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2. Evaluate  $\int_0^1 \frac{\tan^{-1} x}{1 + x^2} dx$

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3. Find (i)  $\int e^x \left( \tan^{-1} x + \frac{1}{1 + x^2} \right) dx$  (ii)  $\int \frac{(x^2 + 1)e^x}{(1 + x)^2} dx$

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

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

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6. Find  $\int e^x \sin x dx$

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7. Evaluate using limit sum  $\int_0^2 e^x dx$

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8. Evaluate the following integrals: (i)  $\int_2^3 x^2 dx$  (ii)  $\int_4^9 \frac{\sqrt{x}}{(30-x^{\frac{3}{2}})^2} dx$

(iii)  $\int_1^2 \frac{x dx}{(x+1)(x+2)}$  (iv)  $\int_0^{\frac{\pi}{4}} \sin^3 2t \cos 2t dt$

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9. Find  $\int \sqrt{3 - 2x - x^2} dx$

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10. Find  $\int_0^2 (x^2 + 1) dx$  as the limit of a sum.

A.  $\frac{14}{3}$

B.  $-\frac{14}{3}$

C.  $\frac{16}{3}$

D.  $-\frac{16}{3}$

**Answer: A**

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

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

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13. If  $I = \int (\sqrt{\cot x} - \sqrt{\tan x}) dx$ , then  $I$  equals

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14. Find  $\int x \cos x dx$

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

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

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

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

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19. Find  $\int \frac{dx}{(x+1)(x+2)}$

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20. Find the following integrals: (i)  $\int \frac{x+2}{2x^2+6x+5} dx$

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21. Find  $\int x e^x dx$

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22. Find  $\int \log x dx$

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23. Write an anti derivative for each of the following functions using the method of inspection: (i)  $\cos 2x$  (ii)  $3x^2 + 4x^3$  (iii)  $\frac{1}{x}, x \neq 0$

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24. Find the following integrals: (i)  $\int \frac{x^3 - 1}{x^3} dx$  (ii)  $\int \left(x^{\frac{2}{3}} + 1\right) dx$  (iii)  $\int \left(x^{\frac{2}{3}} + 2e^x - \frac{1}{x}\right) dx$

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25. Find the following integrals: (i)  $\int (\sin x + \cos x) dx$  (ii)  $\int \cos ecx (\cos ecx + \cos x) dx$  (iii)  $\int \frac{1 - \sin x}{\cos^2 x} dx$

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26. Find the anti derivative F of f defined by  $f(x) = 4x^3 - 6$ , where  $F(0) = 3$

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27. Integrate the following functions w.r.t. x:

(i)  $\sin mx$

(ii)  $2x \sin(x^2 + 1)$

(iii)  $\frac{\tan^4 \sqrt{x} \sec^2 \sqrt{x}}{\sqrt{x}}$

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

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28. Find the following integrals: (i)  $\int \sin^3 x \cos^2 x dx$  (ii)

$\int \frac{\sin x}{\sin(x + a)} dx$  (iii)  $\int \frac{1}{1 + \tan x} dx$

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29. Find (i)  $\int \cos^2 x dx$  (ii)  $\int \sin 2x \cos 3x dx$  (iii)  $\int \sin^3 x dx$

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30. Find the following integrals: (i)  $\int \frac{dx}{x^2 - 16}$  (ii)  $\int \frac{dx}{\sqrt{2x - x^2}}$

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31. Find the following integrals : (i)  $\int \frac{dx}{x^2 - 4x + 13}$  (ii)  
 $\int \frac{dx}{3x^2 + 13x - 10}$

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

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

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34. Evaluate  $\int_1^{\frac{3}{2}} |x \sin(\pi x)| dx$

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

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36. Find  $\int \frac{(x^4 - x)^{\frac{1}{4}}}{x^5} dx$

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37. Evaluate  $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^2 x dx$

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

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39. Evaluate  $\int_{-1}^1 \sin^5 x \cos^4 x dx$

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

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41. Evaluate  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\tan x}}$

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

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

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44. Evaluate  $\int_0^{\frac{\pi}{2}} \log \sin x dx$

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45. Find  $\int x \sqrt{1 + x - x^2} dx$

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46. Find the following integrals:  $\int \frac{x + 3}{\sqrt{5 - 4x + x^2}} dx$

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## Exercise 7 1

1. Find the integral  $\int \frac{x^3 + 3x + 4}{\sqrt{x}} dx$

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2. Find the integral  $\int \frac{x^3 - x^2 + x - 1}{x - 1} dx$

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3. The anti derivative 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)  $\frac{3}{2}x^{\frac{3}{2}} + \frac{1}{2}x^{\frac{1}{2}} + C$

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4. Find the integral  $\int \frac{2 - 3 \sin x}{\cos^2 x} dx$

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5. If  $\frac{d}{dx}f(x) = 4x^3 - \frac{3}{x^4}$  such that  $f(2) = 0$ . Then  $f(x)$  is (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)  $x^3 + \frac{1}{x^4} - \frac{129}{8}$

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

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

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

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9. Find the integral  $\int x^2 \left( 1 - \frac{1}{x^2} \right) dx$



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10. Find the integral  $\int(4e^{3x} + 1) dx$

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11. Find an anti derivative (or integral) of the following functions by the method of inspection.  $\sin 2x - 4e^{3x}$

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

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13. Find the integral  $\int(2x^2 + e^x) dx$

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14. Find the integral  $\int(ax^2 + bx + c)dx$

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15. Find the integral  $\int \sec x(\sec x + \tan x)dx$

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16. Find the integral  $\int \frac{\sec^2 x}{\cos ec^2 x} dx$

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17. Find the integral  $\int(1 - x)\sqrt{x}dx$

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18. Find the integral  $\int \sqrt{x}(3x^2 + 2x + 3) dx$

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19. Find the integral  $\int (2x - 3 \cos x + e^x) dx$

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20. Find the integral  $\int (2x^2 - 3 \sin x + 5\sqrt{x}) dx$

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21. Find the integral  $\int \left( \sqrt{x} - \frac{1}{\sqrt{x}} \right)^2 dx$

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

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## Exercise 7 8

1. Evaluate the following definite integrals as limit of sums.

$$\int_1^4 (x^2 - x) dx$$

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2. Evaluate the following definite integrals as limit of sums.  $\int_{-1}^1 e^x dx$

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3. Evaluate the following definite integrals as limit of sums.  $\int_a^b x dx$

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4. Evaluate the following definite integrals  $\int_0^4 (x + e^{2x}) dx$

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5. Evaluate the following definite integrals as limit of sums.

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

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6. Evaluate the following definite integrals as limit of sums.  $\int_2^3 x^2 dx$

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1. Integrate the functions  $\frac{x}{\sqrt{x+4}}$ ,  $x > 0$

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2. Integrate the functions  $\frac{1}{x - \sqrt{x}}$

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3. Integrate the functions  $\frac{x^2}{(2 + 3x^3)^3}$

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4. Integrate the functions  $(x^3 - 1)^{\frac{1}{3}} x^5$

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5. Integrate the functions  $\frac{x}{9 - 4x^2}$

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6. Integrate the functions  $\frac{1}{x(\log x)^m}, x > 0$

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7. Integrate the functions  $\frac{x}{e^{x^2}}$

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8. Integrate the functions  $e^{2x+3}$

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9. Integrate the functions  $\frac{e^{2x} - 1}{e^{2x} + 1}$

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10. Integrate the functions  $\frac{e^{\tan^{-1}x}}{1 + x^2}$

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11. Integrate the functions  $\frac{(\log x)^2}{x}$

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12. Integrate the functions  $\frac{1}{x + x \log x}$

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13. Integrate the functions  $\frac{2x}{1+x^2}$

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14. Integrate the functions  $\sqrt{ax+b}$

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15. Integrate the functions  $x\sqrt{x+2}$

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16. Integrate the functions  $\sin x \sin(\cos x)$

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17. Integrate the functions  $\sin(ax + b)\cos(ax + b)$

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18. Integrate the functions  $x\sqrt{1 + 2x^2}$

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19. Integrate the functions  $(4x + 2)\sqrt{x^2 + x + 1}$

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

(A)  $\tan x + \cot x + C$

(B)  $\tan x - \cot x + C$

(C)  $\tan x \cot x + C$

(D)  $\tan x - \cot 2x + C$

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21.  $\int \frac{10x^9 + 10^x \log_{e^{10}} dx}{x^{10} + 10^x}$  equals

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

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

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

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

**Answer: D**

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22. Integrate the functions  $\frac{x^3 \sin(\tan^{-1} x^4)}{1 + x^8}$

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23. Integrate the functions  $\frac{(1+x)(x+\log x)^2}{x}$

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24. Integrate the functions  $\frac{(1+\log x)^2}{x}$

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25. Integrate the functions  $\frac{\sqrt{\tan x}}{\sin x \cos x}$

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26. Integrate the functions  $\frac{1}{1-\tan x}$

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27. Integrate the functions  $\frac{1}{1 + \cot x}$

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28. Integrate the functions  $\frac{\sin x}{(1 + \cos x)^2}$

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29. Integrate the functions  $\frac{\sin x}{1 + \cos x}$

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30. Integrate the functions  $\frac{\cos x}{\sqrt{1 + \sin x}}$

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31. Integrate the functions

$\cot x \log \sin x$

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32. Integrate the functions  $\frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}}$

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33. Integrate the functions  $\tan^2(2x - 3)$

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34. Integrate the functions  $\sec^2(7 - 4x)$

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35. Integrate the functions  $\frac{\sin^{-1} x}{\sqrt{1-x^2}}$

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36. Integrate the functions  $\frac{2 \cos x - 3 \sin x}{6 \cos x + 4 \sin x}$

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37. Integrate the functions  $\frac{1}{\cos^2 x (1 - \tan x)^2}$

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38. Integrate the functions  $\frac{\cos \sqrt{x}}{\sqrt{x}}$

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39. Integrate the functions  $\sqrt{\sin 2x} \cos 2x$

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## Exercise 7 4

1. Integrate the functions  $\frac{x + 3}{x^2 - 2x + 5}$

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2. Integrate the functions  $\frac{5x + 3}{\sqrt{x^2 + 4x + 10}}$

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3. Integrate the functions  $\frac{x + 2}{\sqrt{4x - x^2}}$

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4. Integrate the functions  $\frac{x + 2}{\sqrt{x^2 + 2x + 3}}$

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

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6.  $\int \frac{dx}{\sqrt{9x - 4x^2}}$  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)  
 $\frac{1}{2} \sin^{-1} \left( \frac{9x - 8}{9} \right) + C$

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7. Integrate the functions  $\frac{1}{\sqrt{7 - 6x - x^2}}$

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8. Integrate the functions  $\frac{x + 2}{\sqrt{x^2 - 1}}$

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9. Integrate the functions  $\frac{4x + 1}{\sqrt{2x^2 + x - 3}}$

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10. Integrate the functions  $\frac{1}{\sqrt{(x - a)(x - b)}}$

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11. Integrate the functions  $\frac{1}{\sqrt{8 + 3x - x^2}}$

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12. Integrate the functions  $\frac{1}{\sqrt{(x - 1)(x - 2)}}$

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13. Integrate the functions  $\frac{1}{9x^2 + 6x + 5}$

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14. Integrate the functions  $\frac{1}{\sqrt{x^2 + 2x + 2}}$

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15. Integrate the functions  $\frac{6x + 7}{\sqrt{(x - 5)(x - 4)}}$

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16. Integrate the functions  $\frac{5x - 2}{1 + 2x + 3x^2}$

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17. Integrate the functions  $\frac{3x^2}{x^6 + 1}$

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18. Integrate the functions  $\frac{1}{\sqrt{1 + 4x^2}}$

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19. Integrate the functions  $\frac{1}{\sqrt{(2-x)^2 + 1}}$

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20. Integrate the functions  $\frac{1}{\sqrt{9 - 25x^2}}$

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21. Integrate the functions  $\frac{3x}{1 + 2x^4}$

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22. Integrate the functions  $\frac{x^2}{1 - x^6}$

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23. Integrate the functions  $\frac{x - 1}{\sqrt{x^2 - 1}}$

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24. Integrate the functions  $\frac{x^2}{\sqrt{x^6 + a^6}}$

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25. Integrate the functions  $\frac{\sec^2 x}{\sqrt{\tan^2 x + 4}}$

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