MATHS

BOOKS - ACCURATE PUBLICATION

DEFINITE INTEGRALS

Example

1. Evaluate : $\int_2^4 \left(x^2 - 1\right) dx.$

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2. Evaluate $\int_0^1 e^{2x}\,dx.$

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3. Evaluate $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$

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4. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{(2+\sin x)(3+\sin x)}\,dx$

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5. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{(3+\sin x)(4+\sin x)} dx$

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6. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{(4+\sin x)(5+\sin x)} dx$

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7. Show that : $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}} dx = \frac{\pi}{4}.$

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8. Evaluate $\int_{\pi/6}^{\pi/3} \left(\frac{1}{1+\sqrt{\cot x}} \right.$ dx

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9. $\int_{0}^{\pi/2} \left(\frac{\sqrt{\cos x}}{\sqrt{\sin x}+\sqrt{\cos x}} \right) dx$ is equal to

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10. By using the properties of definte, prove that

$$\int_0^{\pi/2} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx = \frac{\pi}{4}$$

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11. Find the following integrals

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

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12. Evaluate : $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\tan^{\frac{3}{2}} x} dx.$

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13. Evaluate $\int_{\pi/6}^{\pi/3} \left(\frac{1}{1+\sqrt{\tan x}} \right.$ dx

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14. Evaluate $\int_{-1}^{1} |2x+1|$ dx

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15. Evaluate $\int_{-1}^{1} |2x+1| dx.$

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16. Evaluate $\int_{-1}^{1} |2x+1| dx.$

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17. Show that : $\int_{-5}^{5} |x+2| dx = 29.$

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18. Show that : $\int_{-2}^{2} |x+1| dx = 5.$

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19. Evaluate $\int_{-6}^{6} |x+3| dx.$

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20. Evaluate : $\int_{0}^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$

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21. Prove that following:

$$\int_0^{\pi} \frac{x \tan x}{\sec x + \cos x} dx = \frac{\pi^2}{4}$$

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22. Using properties of definite integrals, show that

$$\int_0^{\pi/2} \frac{x dx}{\sin x + \cos x} = \frac{\pi}{2\sqrt{2}} \log\left(\sqrt{2} + 1\right)$$

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23. Evaluate $\int_0^{\frac{\pi}{2}} \sin x \, dx$

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24. Evaluate $\int_0^{\pi/2} \log|\cos x| dx$

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25. Using properties of definite integrals, show that

$$\int_0^{\pi/2} \frac{\sin^2 x}{\sin x + \cos x} dx = \frac{1}{\sqrt{2}} \log\left(\sqrt{2} + 1\right)$$

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

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

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

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Question Carrying 1 Mark Type I

1. $\int_0^2 x^2 + 2$ dx is equal to :

A. $\frac{20}{3}$

B. $\frac{28}{3}$

C. $\frac{38}{3}$

D. 27

Answer:

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2. $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$ is equal to :

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

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

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

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

Answer:

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3. $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$ is equal to :

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

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

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

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

Answer:

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4. $\int_0^1 \frac{dx}{1+x^2}$ is equal to :

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

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

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

D. $\frac{7\pi}{12}$

Answer:

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5. $\int_0^{\sqrt{3}} \frac{dx}{1+x^2}$ dx is equal to :

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

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

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

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

Answer:

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6. $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$ is equal to :

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

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

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

D. $\frac{7\pi}{12}$

Answer:

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7. $\int_0^{\infty} \frac{1}{1+x^2} dx$ is equal to :

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

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

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

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

Answer:

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8. $\int_{-1}^{1}\left(x^{91}+x^{93}\right)dx$ is equal to :

A. 2

B. $\frac{93}{4324}$

C. -1

D. 0

Answer:

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9. $\int_{-1}^{1}\left(x^{71}+x^{73}\right)dx$ is equal to :

A. $\frac{73}{2664}$

B. 2

C. 0

D. -1

Answer:

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10. $\int_{-1}^{1}\left(x^{19}+x^{21}\right)dx$ is equal to :

A. 0

B. 1

C. -1

D. $\frac{21}{220}$

Answer:

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11. $\int_{-3}^{3}(x+\sin x)dx$ is equal to :

A. $9+2\sin 3$

B. 6

C. 0

D. 2 sin 3

Answer:

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12. $\int_{-1}^{1}(x+\sin x)dx$ is equal to :

A. $1+x$

B. 0

C. 2

D. 2 sin 2

Answer:

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13. $\int_{-2}^{2}(x+\sin x)dx$ is equal to :

A. $4+\sin 2$

B. 4

C. 0

D. 2 sin 2

Answer:

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14. $\int_{-3}^{3} x^3 dx$ is equal to :

A. $\frac{81}{94}$

B. 27

C. -1

D. 0

Answer:

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15. $\int_1^5 \frac{\sqrt{6-x}}{\sqrt{x}+\sqrt{6-x}}dx$ equals :

A. 2

B. 0

C. 1

D. 3

Answer:

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16. $\int_2^6 \frac{\sqrt{8-x}}{\sqrt{x}+\sqrt{8-x}}dx$ equals :

A. 0

B. 1

C. 2

D. 3

Answer:

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17. $\int_0^{\pi} \sin^2 x \cos^3 dx$ is equal to

A. 0

B. -1

C. 0

D. 2

Answer:

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18. $\int_0^{\pi} \sin^3 x \cos^5 x dx$ is equal to :

A. 1

B. -1

C. 2

D. 0

Answer:

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19. $\int_0^{\pi/2} \left(\frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}} \right) dx$ is equal to

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

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

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

D. None of these

Answer:

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

A. 0

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

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

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

Answer:

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21. $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{3}{2}} x}{\sin^{\frac{3}{2}} x + \cos^{\frac{3}{2}} x} dx$ is equal to :

A. 0

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

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

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

Answer:

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22. $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{3}{2}} x}{\sin^{\frac{3}{2}} x + \cos^{\frac{3}{2}} x} dx$ is equal to :

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

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

C. π

D. 2π

Answer:

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23. $\int_0^{\pi/2} \left(\frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}} \right) dx$ is equal to

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

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

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

D. None of these

Answer:

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

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

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

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

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

Answer:

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25. The value of the integral $\int_{\frac{1}{3}}^{1} \frac{\left(x - x^3\right)^{\frac{1}{3}}}{x^4} dx$ is :

A. 6

B. 0

C. 3

D. 4

Answer:

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26. 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:

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27. 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:

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28. The value of $\int_0^1 \frac{x^4(1-x)^4}{1+x^2}dx$ is (are)

A. 1

B. 0

C. -1

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

Answer:

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

Answer:

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30. If f and g are continuous functions in [0, 1] satisfying

$f(x) = f(a - x)$ and $g(x) + g(a - x) = a$,

then $\int_0^a f(x) \cdot g(x)dx$ is equal to

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

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

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

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

Answer:

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

A. 3

B. 6

C. 9

D. 1

Answer:

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

A. log 2

B. 2 log 2

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

D. $4 \log 2$

Answer:

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33. If $\int_0^1 \frac{e^t}{1+t}dt = a$, then $\int_0^1 \frac{e^t}{(1+t)^2}dt$ is equal to

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

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

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

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

Answer:

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

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

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

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

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

Answer:

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35. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{dx}{1+\cos 2x}$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer:

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36. $\int_0^{\frac{\pi}{2}} \sqrt{1-\sin 2x}dx$ is equal to

A. $2\sqrt{2}$

B. $2\left(\sqrt{2}+1\right)$

C. 2

D. $2\left(\sqrt{2}-1\right)$

Answer:

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Question Carrying 1 Mark Type Ii

1. $\int_1^3 \left(x^2+2\right) dx$ is equal to :

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2. $\int_0^1 \frac{dx}{1+x^2}$ is equal to :

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3. $\int_0^{\sqrt{3}} \frac{dx}{1+x^2}$ dx is equal to :

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4. $\int_0^{\frac{1}{\sqrt{3}}} \frac{dx}{1+x^2}$ is equal to .....

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5. $\int_{-1}^{1} x^{11} \cos^4 x dx$ is equal to :

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6. $\int_{-1}^{1} x^5 \cos^6 x dx$ is equal to .....

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7. Evaluate $\int_{-1}^{1} x^{17} \cos^4 x dx$

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8. $\int_{3}^{7} \frac{\sqrt{10-x}}{\sqrt{x}+\sqrt{10-x}} dx$ equals :

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9. $\int_{0}^{\pi} \sin^3 x \cos^7 x dx$ is equal to :

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10. $\int_0^{\pi/2} \left(\frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}} \right) dx$ is equal to

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11. $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{5}{2}} x}{\sin^{\frac{5}{2}} x + \cos^{\frac{5}{2}} x} dx$ is equal to :

Watch Video Solution

12. $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{5}{2}} x}{\sin^{\frac{5}{2}} x + \cos^{\frac{5}{2}} x} dx$ is equal to :

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13. By using the properties of definte, prove that

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

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

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15. The value of $\int_{-\pi/2}^{\pi/2} \left(x^3 + x\cos x + \tan^5 x + 1\right) dx$ is :

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16. If $f(a+b-x) = f(x)$, then $\int_a^b x f(x) dx$ is equal to:

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17. $\int_{-a}^{a} f(x)dx = 0$ if f is an ..... function.

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18. $\int_{0}^{2a} f(x)dx = 2\int_{0}^{a} f(x)dx$, if f(2a-x) = ...

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19. $\int_0^{\frac{\pi}{2}} \frac{\sin^n x dx}{\sin^n x + \cos^n x} = \ldots\ldots\ldots .$

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20. $\int_0^{\frac{\pi}{2}} \cos x e^{\sin x} dx$ is equal to $\ldots\ldots\ldots\ldots .$

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21. If $\int_0^a \frac{1}{1+4x^2} dx = \frac{\pi}{8}$, then a = $\ldots\ldots\ldots\ldots .$

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Question Carrying 1 Mark Type Iii

1. $\int_a^b f(x)dx$ represents the area of the region bounded by the curve f(x), the x-axis and the ordinates x = a and x = b. Find $\int_0^{\frac{\pi}{2}} \sin x dx$

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2. Let f be a continuous function on the closed interval [a, b] and let A(x) be the area function.

Then show that A'(x) = f(x), for all $x \in [a, b]$.

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3. $\int_a^b f(x)dx = F(b) - F(a).$

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4. $\int_a^b f(x)dx = \int_a^b f(z)dz.$

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5. $\int_a^b f(x)dx = \int_b^a f(x)dx.$

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6. $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx.$

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7. $\int_0^a f(x)dx = \int_a^0 f(a-x)dx.$

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8.

$$\int_0^{2a} f(x)dx = \int_0^a f(x)dx + \int_0^a f(2a-x)dx$$

.

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9. If f(x) is an odd function, then

$$\int_{-a}^{a} f(x)dx = 0.$$

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

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11. $\int_0^1 \frac{2x}{1+x^2}dx = \log 2$

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12. $\int_0^1 \frac{2x}{5x^2+1}dx = \log 6$

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13. If $\int_0^1 (3x^2 + 2x + k)dx = 0$, then k = -2.

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

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15. If f(x) is an odd function, then $\int_{-a}^{a} f(x)dx = 0$.

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16. $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx.$

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17. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^3 x dx = 2.$

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18. $\int_0^{\frac{\pi}{2}} \log \tan x dx = 0.$

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

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Question Carrying 2 Marks

1. Evaluate : $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cos 2x \log \sin x dx.$

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

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3. Evaluate : $\int_0^1 x e^{x^2} dx$

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

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

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6. Prove that :

$\int_0^{\frac{\pi}{4}} \left(\sqrt{\tan x} + \sqrt{\cot x}\right) dx = \sqrt{2}. \frac{\pi}{2}.$

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7. Evaluate the definite integral:

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx$$

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8. Evaluate $\int_0^{\frac{\pi}{2}} \sin 2x \tan^{-1}(\sin x) dx.$

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

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10. Evaluate $\int_{\pi/6}^{\pi/3} \left(\frac{1}{1+\sqrt{\tan x}} \right.$ dx

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11. Evaluate $\int_0^{\pi/4} \log(1+\tan x) dx.$

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12. Evaluate $\int_{-1}^{1} |2x+1| dx.$

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Question Carrying 4 Marks

1. Prove that : $\int_{0}^{\pi} \frac{x \tan x}{\sec x \cos ecx} dx = \frac{\pi^2}{4}.$

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2. Using property of define integrals, prove that :

$$\int_0^1 \frac{\log(1+x)}{1+x^2} = \frac{\pi}{8}\log 2$$

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3. Show that :

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

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4. Prove that : $\int_0^{\pi} \frac{x \tan x}{\sec x \cos ecx} dx = \frac{\pi^2}{4}$.

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5. By using the properties of definite integrals,

evaluate the following :

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

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

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7. By using the properties of definte, prove that

$$\int_0^a \frac{\sqrt{x}dx}{\sqrt{x}+\sqrt{a-x}} = \frac{a}{2}$$

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8. Evaluate :

$$\int_2^4 \{|x-2|+|x-3|+|x-4|\}dx.$$

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