MATHS

BOOKS - MAHAVEER PUBLICATION
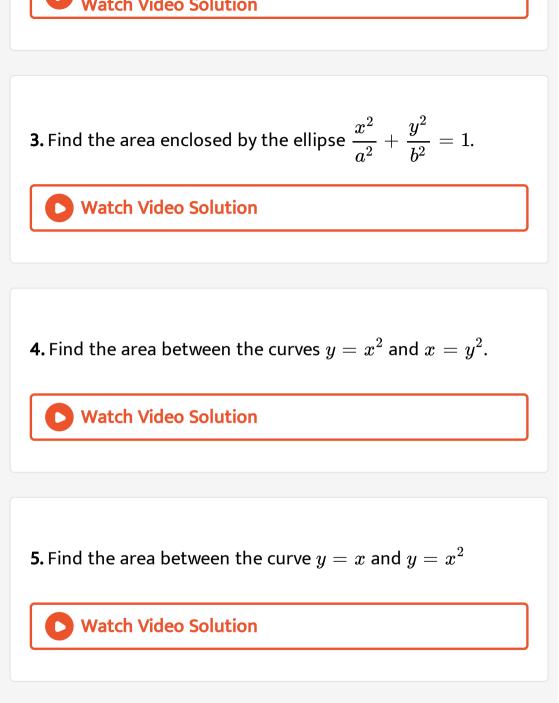
APPLICATION OF INTEGRALS

Question Bank

1. Find the area under the curve $f(x) = x^{\frac{3}{2}}$ from[0,2]

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2. Find the area enclosed by the circle $x^2 + y^2 = a^2$.

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3. Find the area enclosed by the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$.

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4. Find the area between the curves $y = x^2$ and $x = y^2$.

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5. Find the area between the curve $y = x$ and $y = x^2$

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6. Find the area between the curves $y = x^2$ and $y = 4$

7. Calculate the area bouded by the parabola $y^2 = 4ax$ and its latus rectum

8. Area lying in the first quadrant and bounded by the circle $x^2 + y^2 = 4$ and the lines $x = 0$ and $x = 2$ is :

A. π

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

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

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

Answer: A

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9. Area (in square units) of the region bounded by the curve $y^2 = 4x$, y-axis and the line $y = 3$, is
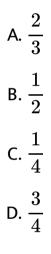
A. 2

B. $\dfrac{9}{4}$

C. $\dfrac{9}{3}$

D. $\dfrac{9}{2}$

Answer: B

10. Area lying between the curves $y^2 = 4x$ and $y = 2x$ is

A. $\dfrac{2}{3}$

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

C. $\dfrac{1}{4}$

D. $\dfrac{3}{4}$

Answer: B

11. Find the area bounded by the curve $y = \cos x$ between $x = 0$ and $x = 2\pi$.

A. 1

B. 2

C. 3

D. 4

Answer: D

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12. Area lying between the curves $y = |x|$, x=1 and x=-1 is

A. 1

B. 0

C. 3

D. -1

Answer: B

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13. Find the area under the curve f(x)=2x from[0,2].

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14. Find by the method of integration the area of the region bounded by the parabola $y^2 = 8x$ and its latus rectum.

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15. Find the area of region bounded by the bounded by the parabola $y^2 = x$, x=0, x=2 and the x-axis.

16. Find by the method of integration the area of the region bounded by the parabola $y^2 = 16x$ and the line x=5.

17. Find the area of the portion enclosed between the curves $y^2 = 4x$ and $x^2 = 4y$.

18. Find the area of the regions bounded by the parabola $y^2 = 4ax$ and the line x=a.

19. Find area under the curve y=sin 2x between the ordinates $x = \dfrac{\pi}{2}$ and $x = \pi$.

20. Find by integration, the area of the triangle bounded by the lines 4y-5x=0 and x=4.

21. Find the center and radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0.$

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22. Find the equation of the parabola with vertex (0,0) and passing through (2,3) and axis is along the x-axis.

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23. In what ratio does the origin divides the line segment joining the points P(-1,-2,-3) and Q(4,8,12).

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24. Find the direction cosines of the line whose direction ratios are 2,-4,6.

25. If $g(x) = 2^x$, show that g(a).g(b) = g(a+b).

26. Find $\displaystyle\lim_{x \to 2} \frac{x^2 - 9x + 14}{x^2 + 9x - 22}$

27. Examine the continuity of f(x) at x=0 if f(x)=$\dfrac{\sin 2x}{2x}$, $x \neq 0$

28. Find $\dfrac{dy}{dx} : y = \sqrt{1 + x^2}$

29. Find $\dfrac{dy}{dx} : x = \dfrac{2at}{1 + t^2} , y = \dfrac{a\left(1 - t^2\right)}{1 + t^2}$

30. Find $\dfrac{dy}{dx}$ if $xy = \sin x.$

31. Find the maximum and minimum values of the function

$$y = 4x^3 - 15x^2 + 12x - 2$$

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32. Find the unit vector in the direction of the vector

$$\vec{a} + \vec{b} \quad \text{if} \quad \vec{a} = \vec{i} + 2\vec{j} + 3\vec{k} \quad \text{and} \quad \vec{b} = 2\vec{i} + 3\vec{j} + 5\vec{k}$$

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33. Integrate: $\int$ cos ecx (cos ecx +cot x) dx

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34. Integrate: $\int 6x\left(3x^2 + 7\right)^7 dx$

35. If (x+y, x-y)=(1,2), find x and y.

36. Find the value of $\displaystyle\int_0^{\frac{\pi}{4}} \frac{\sec^2 x\, dx}{1 + \tan^2 x}$
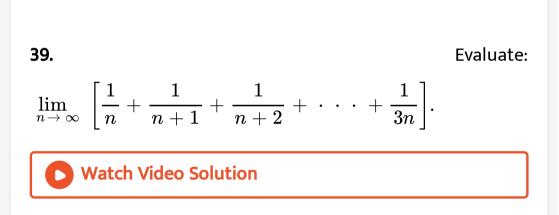
37. Using the properties of the definite integral, prove that

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

38. Find the area of the region bounded by the parabola $y^2 = 4ax$ and the line x=a.

39. Evaluate:

$$\lim_{n \to \infty} \left[\frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \cdots + \frac{1}{3n} \right].$$

40. If $y = Ae^{mx} + Be^{-mx}$, show that $\dfrac{d^2y}{dx^2} - m^2 y = 0$.