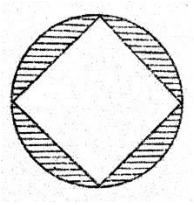
CHAPTER 8

APPLICATIONS OF DEFINTE INTEGRALS

SAY 2018

1. In a circle of radius 2, a square is inscribed as shown in the figure.

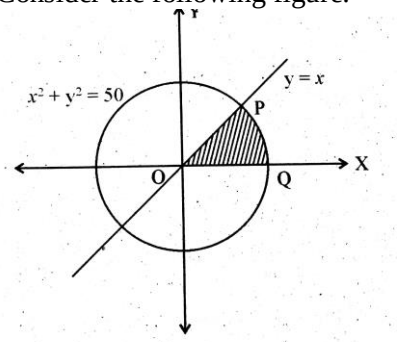


Using integration, find the area of the shaded region. (Area of a square or a triangle may be calculated using any convenient method). (6)

MARCH 2018

2. Find the area of the region bounded by the curve $y^2 = x$, x axis and the line $x = 1$ and $x = 4$. (3)

3. Consider the following figure.



a) Find the point of intersection P of the circle $x^2 + y^2 = 50$ and the line $y = x$. (1)

b) Find the area of the shaded region. (3)

SAY 2017

4. a) Area below the curve $y = -2x + 3$ in the first quadrant.

a) 1/4 b) 9/8
c) 2 d) 8 (1)

b) Draw rough sketch of the curves $x^2 + y^2 = 4$ and $(x-2)^2 + y^2 = 4$. Also find the area between these two curves. (5)

MARCH 2017

5. a) Area bounded by the curves $y = \cos x, x = \frac{\pi}{2}, x = 0, y = 0$ is

a) $\frac{1}{2}$ b) $\frac{2}{\pi}$
c) 1 d) $\frac{\pi}{2}$ (1)

b) Find the area between the curves $y^2 = 4ax$ and $x^2 = 4ay, a > 0$. (5)

SAY 2016

6. a) The area bounded by the curve $y = 2\cos x$, , the x – axis from $x = 0 to x = \frac{\pi}{2}$ is

i) 0 ii) 1
iii) 2 iv) -1 (1)

b) Find the area of the region bounded by the curves $y^2 = 4ax$ and $x^2 = 4ay, a > 0$ (5)

OR

7. a) The area bounded by the curve $y = f(x)$, above the x-axis, between $x = a$ and $x = b$ is

i) $\int_{f(a)}^{b} y\,dy$ ii) $\int_{a}^{f(b)} x\,dx$
iii) $\int_{a}^{b} x\,dy$ iv) $\int_{a}^{b} y\,dx$ (1)

b) Find the area of the circle $x^2 + y^2 = 4$ using integration. (5)

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MARCH 2016

8. a) The area bounded by the curve $y = f(x)$, above the x-axis, between $x = a$ and $x = b$ is

i) $\int_{f(a)}^{b} y\,dy$ ii) $\int_{a}^{f(b)} x\,dx$

iii) $\int_{a}^{b} x\,dy$ iv) $\int_{a}^{b} y\,dx$ (1)

b) Find the area of the circle $x^2 + y^2 = 4$ using integration. (5)

SAY 2015

9. a) Find the area of the region enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (3)

b) Find the area of the region bounded by the parabolas $y = x^2$ and $y^2 = x$ (3)

MARCH 2015

10. Consider the functions: $f(x) = |x| - 1$ and $g(x) = 1 - |x|$

a) Sketch their graphs and shade the closed region between them. (2)

b) Find the area of their shaded region. (2)

SAY 2014

11. Consider the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and the line

$\frac{x}{3} + \frac{y}{2} = 1$

a) Find the points where the line intersects the ellipse? (1)

b) Shade the smaller region bounded by the ellipse and the line. (1)

c) Find the area of the shaded region. (4)

MARCH 2014

12. Consider the following figure:

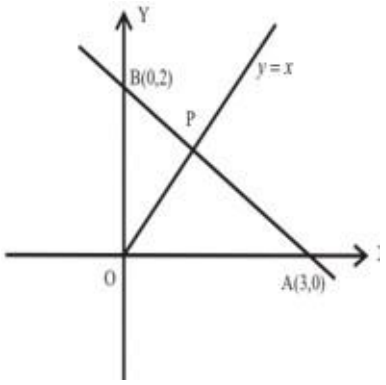
a) Find the points of intersection P, of the circle $x^2 + y^2 = 32$ and the line y = x. (2)

b) Express the area of the shaded portion as a sum of two definite integrals. (1)

c) Find the area of the shaded portion. (3)

SAY 2013

13. Using the figure,



a) Find the equation of AB (1)

b) Find the point P (2)

c) Find the area of the shaded region by integration. (3)

MARCH 2013

14. a) Find the point at which the circle $x^2 + y^2 = 32$ intersects the positive x axis.

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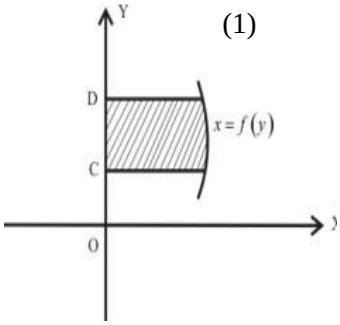
(1)

b) Shade the region in the first quadrant enclosed by x axis, the line $y = x$ and the circle $x^2 + y^2 = 32$ (1)

d) Find the area of the shaded region. (4)



SAY 2012

15. i) Area of the shaded portion in the figure is equal to

a) $\int_d^e f(x)dx$ b) $\int_e^d f(x)dx$

c) $\int_d^e f(y)dy$ d) $\int_e^d f(y)dy$ (1)

ii) Consider the curves $y = x^2, x = 0, y = 1, y = 4$

Draw a rough sketch and shade the region bounded by these curves. Find the area of the shaded region. (3)

Find the area of the shaded region. (2)

MARCH 2012

16. a) Find the area of the region bounded by the curves $y^2 = x$ and the lines $x = 1, y = 4$ and the x axis. (2)

b) Using integration, find the area of the triangle with vertices (0,1), (2,2) and (3,1) (4)

SAY 2011

17. a) Draw a rough sketch of the curve $\frac{x^2}{4} + \frac{y^2}{9} = 1$ (1)

b) Find the area bounded by the above curve using integration. (3)

MARCH 2011

18. a) Find the area enclosed between the curve $x^2 = 4y$ and the line $x = 4y - 2$ (2)

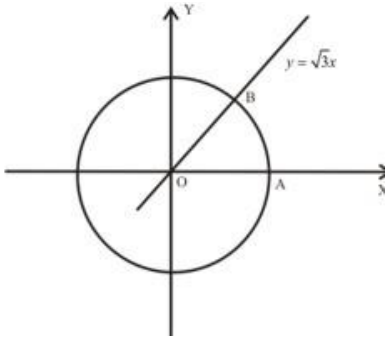
b) Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

SAY 2010

19. Consider the circle $x^2 + y^2 = 16$ and the straight line $y = \sqrt{3}x$ as shown in the figure.

a) Find the point A and B as shown in figure. (1)

b) Find the area of the shaded region in the figure using definite integral. (3)



MARCH 2010

20. Consider the following figure:

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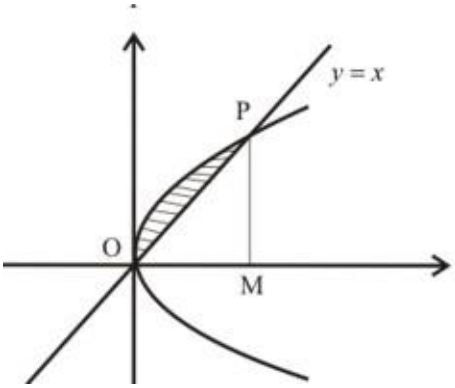
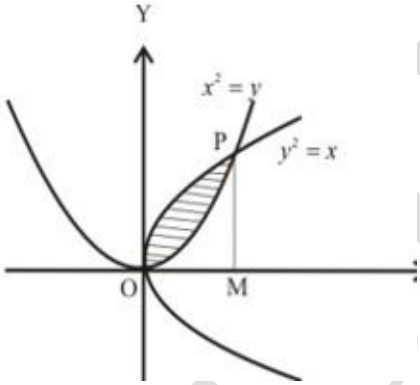


a) Find the points of intersection of the parabola $y^2 = x$ and the line $y = x$. (1)

b) Using integration, find the area enclosed between the parabola and the line. (3)

OR

Consider the following figure.



a) Find the points of intersection of the parabola $y^2 = x$ and $x^2 = y$. (1)

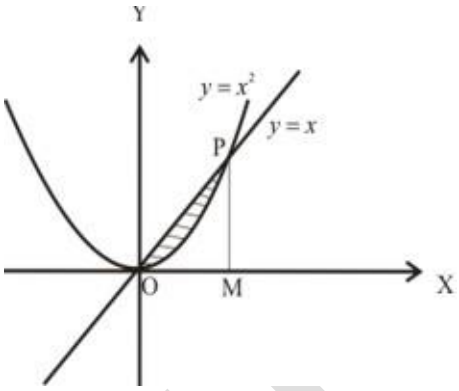
b) Using integration, find the area enclosed between the parabola and the line. (3)

SAY 2009

21. Find the area of the region bounded by the curves $y^2 = 8x$, x axis and $x = 1$ and $x = 3$. (2)

MARCH 2009

22. Consider the figure given below:



a) Find the points of intersection P of the curve. (1)

b) Find the area of the region bounded by the parabola $y^2 = x$ and the line $y = x$ in the first quadrant as shown in the figure. (3)

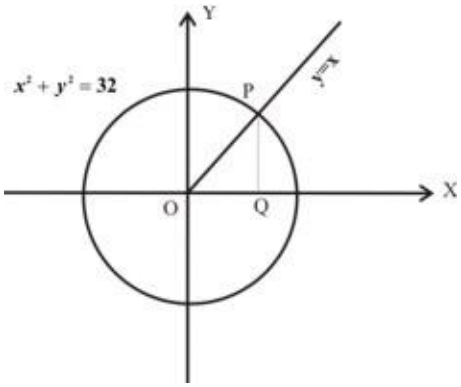
MARCH 2008

23. a) Find the points of intersection of the parabola $y^2 = 8x$ and the line $y = 2x$. (1)

b) Find, using integration, the area enclosed between the line and the parabola. (3)

MARCH 2007

24. Consider the following figure:



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a) Find the point of intersection P of the circle $x^2+y^2=32$ and the line $y=x$ (1)

b) Find the area of the shaded portion. (3)

OR

25. Using integration, find the area of the region bounded by the triangle whose vertices are $(-1,1),(0,5),(3,2)$ (4)

MARCH 2006

26. Area of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is

a) 4π b) 9π

c) 6π d) 36π (1)

27. Find the area bounded by the curve $y^2=4ax$ and $x^2=4ay$. (5)

MARCH 2005

28. Find the area of the region bounded by the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ (3)

29. The area bounded by the curve $y=\cos x$ between $x=\frac{\pi}{2}$ and $x=\frac{3\pi}{2}$ is

a) π sq.units b) 2 sq.units

c) 1 sq.unit d) $\frac{1}{2}$ sq.units (1)

MARCH 2004

30. The area between $y=e^x-1$, the x axis and $x=2$ is

a) e^2-1 b) e^2-2

c) e^2-3 d) e^2 (1)

31. Find the area bounded by the curve $y^2=4ax$ and $x^2=4ay$. (5)

MARCH 2003

32. The area between the curve $y^2=x$ and $x=1$ is:

a) $\frac{2}{3}$ b) $\frac{3}{2}$

c) 1 d) 0 (1)

SAY 2002

33. The area bounded by the curve $xy=1, x=1, x=3$ and the x axis is

a) $\log 3$ b) 3

c) $\log 2$ d) 2 (1)

34. Find the area under the curve $y=\sin 2x+\cos 2x$ between $x=0$ and $x=\frac{\pi}{4}$. (2)

35. Find the area under the curve $y=\sqrt{3x+4}$ between $x=0$ and $x=4$ (3)

36. Find the area bounded by the curve $y^2=4ax$ and $x^2=4ay$. (5)

MARCH 2002

37. Area below the curve $y=\sqrt{x}$ between $x=0$ and $x=1$ is

a) $\frac{4}{9}$ b) $\frac{4}{3}$

c) $\frac{2}{3}$ d) $\frac{\sqrt{2}}{3}$ (1)

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38. Find the area enclosed between the curves

$y^2 = 4x$ and $y = 2x$ (5)

MARCH 2001

39. Calculate the area between the curve $y = 4\sqrt{x-1}, 1 \le x \le 3$, x axis and the line $x = 3$.

(3)

40. Find the area bounded by the curve $y^2 = 4ax$ and $x^2 = 4ay$. (5)

MARCH 2000

41. Area of the region bounded by the curve

$y^2 = 4x$, y axis and the line $y = 3$ is

a) 2 sq.units b) $\frac{9}{4}$ sq.units

c) $6\sqrt{3}$ sq.unit d) None of these (1)

42. Prove that the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

πab sq. units. (2)

"Look at the sky. We are not alone. The whole universe is friendly to us and conspires only to give the best to those who dream and work".

Dr. APJ

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