

Chapter 5: Applications of Integrations

5.1-Area

1) Sketch the region bounded by the graphs of the given equations and find the area of the regions.

1) $y = \frac{1}{x^2}$, $y = -x^2$, $x = 1$, $x = 2$
2) $y = \sqrt{x}$, $y = -x$, $x = 1$, $x = 4$
3) $y^2 = -x$, $x - y = 4$, $y = -1$, $y = 2$
4) $x = y^2$, $y - x = 2$, $y = -2$, $y = 3$
5) $y = x^2 + 1$, $y = 5$
6) $y = x^2$, $y = 4x$
7) $y = x^3$, $y = x^2$
8) $y = 1 - x^2$, $y = x - 1$
9) $x + y = 3$, $y + x^2 = 3$
10) $x = y^2$, $x - y - 2 = 0$
11) $x - y + 1 = 0$, $7x - y - 17 = 0$, $2x + y + 2 = 0$
12) $y = \sin 4x$, $y = 1 + \cos \frac{x}{3}$, $x = 0$, $x = \pi$
13) $y = x\sqrt{4 - x^2}$, $y = 0$
14) $y^2 = 4 + x$, $y^2 + x = 2$
15) $y = x\sqrt{x^2 - 9}$, $y = 0$, $x = 5$
16) $y = 4 + \cos 2x$, $y = 3 \sin \frac{x}{2}$, $x = 0$, $x = \pi$

5.2- Volumes (disk or washer method)

l) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis.

1) $y = x^2$, $y = 2$, about the y-axis
2) $y = \frac{1}{x}$, $x = 0$, $y = 1$, $y = 3$, about the y-axis
3) $y = x^2 - 4x$, $y = 0$, about the x-axis
4) $y = \frac{1}{x}$, $x = 1$, $x = 3$, $y = 0$, about the x-axis
5) $y = \sqrt{x}$, $y = 0$, $x = 4$, about the x-axis
6) $y = x^3$, $x = -2$, $y = 0$, about the x-axis
7) $y^2 = x$, $2y = x$, about the y-axis
8) $y = 2x$, $y = 4x^2$, about the y-axis
9) $y = x^2$, $y = 4 - x^2$, about the x-axis
10) $x = y^3$, $x^2 + y = 0$, about the x-axis
11) $x = y^2$, $y - x + 2 = 0$, about the y-axis
12) $x + y = 1$, $y = x + 1$, $x = 2$, about the y-axis
13) $y = \sin 2x$, $y = 0$, $x = 0$, $x = \pi$, about the x-axis
14) $y = 1 + \cos 3x$, $y = 0$, $x = 0$, $x = 2\pi$, about the x-axis

5.3- Volumes (cylindrical shells)

1) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis.

1) $y = \sqrt{x}$, $x = 4$, $y = 0$, about the y-axis
2) $y = \frac{1}{x}$, $x = 1$, $x = 2$, $y = 0$, about the y-axis
3) $y = x^2$, $y^2 = 8x$, about the y-axis
4) $y = x^2 - \sqrt{x}$, $y = 0$, about the y-axis
5) $2x - y - 12 = 0$, $x - 2y - 3 = 0$, $x = 4$, about the y-axis
6) $y = x^3 + 1$, $x + 2y = 2$, $x = 1$, about the y-axis
7) $x^2 = 4y$, $y = 4$, about the x-axis
8) $y^3 = x$, $y = 3$, $x = 0$ about the x-axis
9) $y = 2x$, $y = 6$, $x = 0$ about the x-axis
10) $2y = x$, $y = 4$, $x = 1$, about the x-axis
11) $y = 0$, $y = \cos(x^2)$, $x = 0$, $x = \sqrt{\frac{\pi}{2}}$, about the y-axis
12) $y = 0$, $y = x \sin(x^3)$, $x = 0$, $x = 1$, about the y-axis