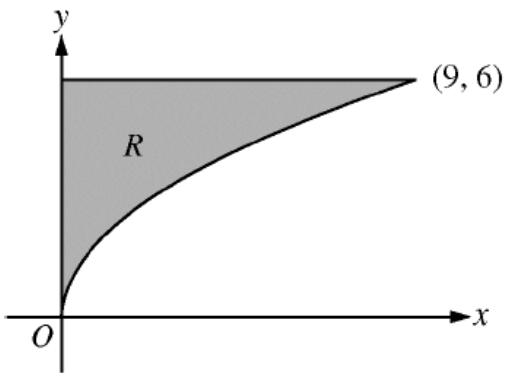
7.2 & 7.3 Extra Practice

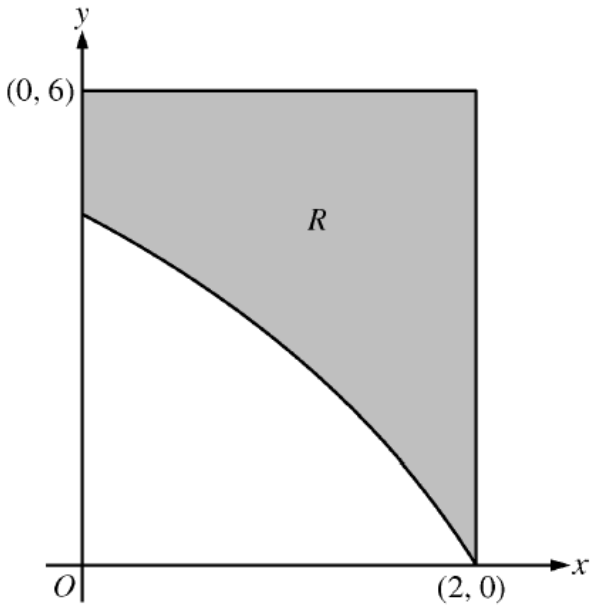


Let R be the region in the first quadrant bounded by the graph of $y = 2\sqrt{x}$, the horizontal line $y = 6$, and the y-axis, as shown in the figure above.

(a) Find the area of R.

(b) Write, but do not evaluate, an integral expression that gives the volume of the solid generated when R is rotated about the horizontal line $y = 7$.

(c) Region R is the base of a solid. For each y, where $0 \le y \le 6$, the cross section of the solid taken perpendicular to the y-axis is a rectangle whose height is 3 times the length of its base in region R. Write, but do not evaluate, an integral expression that gives the volume of the solid.



In the figure above, R is the shaded region in the first quadrant bounded by the graph of $y = 4\ln(3 - x)$, the horizontal line $y = 6$, and the vertical line $x = 2$.

(a) Find the area of R.

(b) Find the volume of the solid generated when R is revolved about the horizontal line $y = 8$.

(c) The region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is a square. Find the volume of the solid.

Let R be the region in the first quadrant bounded by the graphs of $y = \sqrt{x}$ and $y = \frac{x}{3}$.

(a) Find the area of R.

(b) Find the volume of the solid generated when R is rotated about the vertical line $x = -1$.

(c) The region R is the base of a solid. For this solid, the cross sections perpendicular to the y-axis are squares. Find the volume of this solid.

1. Find the area of the region bounded by the graphs $y = \sqrt{x}$, $y = -x$, and $x = 4$.

2. Find the area of the region bounded by the curves $x = y^2$ and $x = 4$.

3. Find the area of the region bounded by the graphs of all four equations:
$f(x) = \sin\left(\frac{x}{2}\right)$; x-axis; and the lines, $x = \frac{\pi}{2}$ and $x = \pi$.

4. Find the volume of the solid obtained by revolving about the x-axis, the region bounded by the graphs of $y = x^2 + 4$, the x-axis, the y-axis, and the lines $x = 3$.

5. Find the volume of the solid obtained by revolving about the y-axis the region bounded by $x = y^2 + 1$, $x = 0$, $y = -1$, and $y = 1$.

6. Let R be the region enclosed by the graph $y = 3x$, the x-axis and the line $x = 4$. The line $x = a$ divides region R into two regions such that when the regions are revolved about the x-axis, the resulting solids have equal volume. Find a.

7. Find the volume of the solid obtained by revolving about the x-axis the region bounded by the graphs of $f(x) = x^3$ and $g(x) = x^2$.

8. The base of a solid is a region bounded by the circle $x^2 + y^2 = 4$. The cross of the solid sections are perpendicular to the x-axis and are equilateral triangles. Find the volume of the solid.

9. Find the volume of the solid obtained by revolving about the y-axis, the region bounded by the curves $x = y^2$ and $y = x - 2$.

10. For Problems 16 through 19, find the volume of the solid obtained by revolving the region as described below. See Figure 12.7-2.

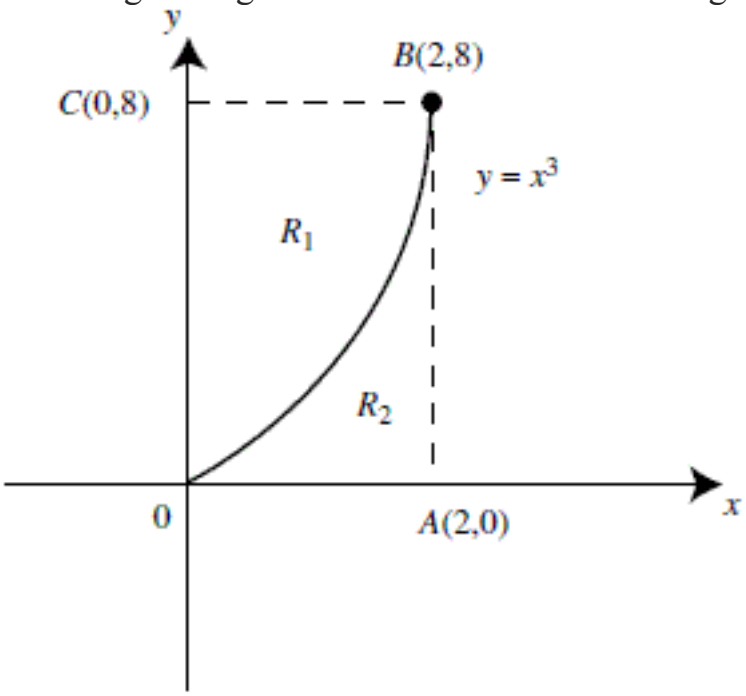
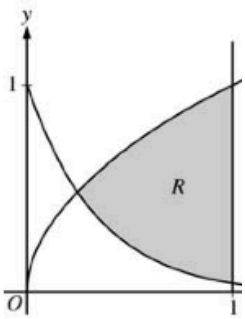


Figure 12.7-2

11. R_1 about the x-axis.
12. R_2 about the y-axis.
13. R_1 about the line $\overleftrightarrow{BC}$.
14. R_2 about the line $\overleftrightarrow{AB}$.

Let R be the shaded region bounded by the graphs of $y = \sqrt{x}$ and $y = e^{-3x}$ and the vertical line $x = 1$, as shown in the figure above.



(a) Find the area of R.

(b) Find the volume of the solid generated when R is revolved about the horizontal line $y = 1$.

(c) The region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is a rectangle whose height is 5 times the length of its base in region R. Find the volume of this solid.