SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the volume of the described solid.

1) The base of a solid is the region between the curve \( y = 3\cos x \) and the \( x \)-axis from \( x = 0 \) to \( x = \pi/2 \). The cross sections perpendicular to the \( x \)-axis are squares with diagonals running from the \( x \)-axis to the curve.

2) The solid lies between planes perpendicular to the \( x \)-axis at \( x = -2 \) and \( x = 2 \). The cross sections perpendicular to the \( x \)-axis are circles whose diameters stretch from the curve \( y = -7\sqrt{4+x^2} \) to the curve \( y = 7\sqrt{4+x^2} \).

3) The solid lies between planes perpendicular to the \( x \)-axis at \( x = -3 \) and \( x = 3 \). The cross sections perpendicular to the \( x \)-axis are semicircles whose diameters run from \( y = -\sqrt{9-x^2} \) to \( y = \sqrt{9-x^2} \).

Find the volume of the solid generated by revolving the shaded region about the given axis.

4) About the \( x \)-axis

5) About the \( y \)-axis
6) About the y-axis

\[ x = 2 \tan \left( \frac{y}{7} \right) \]

Find the volume of the solid generated by revolving the region bounded by the given lines and curves about the x-axis.

7) \( y = \frac{1}{x}, y = 0, x = 1, x = 9 \)

8) \( y = x + 1, y = 0, x = -1, x = 6 \)

9) \( y = 8 \csc x, y = 0, x = \frac{\pi}{4}, x = \frac{3\pi}{4} \)

10) \( y = -4x + 8, y = 4x, x = 0 \)

11) \( y = \sec x, y = \tan x, x = 0, x = \frac{\pi}{4} \)

12) \( y = 7 \cos (\pi x), y = 7, x = -0.5, x = 0.5 \)

Find the volume of the solid generated by revolving the region about the given line.

13) The region in the first quadrant bounded above by the line \( y = 3 \), below by the curve \( y = \sqrt{3x} \), and on the left by the y-axis, about the line \( x = -1 \)

14) The region in the first quadrant bounded above by the line \( 5x + y = 10 \), below by the x-axis, and on the left by the y-axis, about the line \( x = -2 \)

15) The region in the second quadrant bounded above by the curve \( y = 16 - x^2 \), below by the x-axis, and on the right by the y-axis, about the line \( x = 1 \)

Find the volume of the solid generated by revolving the region about the y-axis.

16) The region in the first quadrant bounded on the left by \( y = \frac{3}{x} \), on the right by the line \( x = 3 \), and above by the line \( y = 2 \)
17) The region enclosed by the triangle with vertices (3, 0), (3, 2), (5, 2)  

18) The region in the first quadrant bounded on the left by $y = x^3$, on the right by the line $x = 4$, and below by the x-axis

Solve the problem.

19) A frustum of a right circular cone has a height of 10 m, a base of radius 2 m, and a top of radius 1 m. Find its volume.

20) Find the volume of the solid that is generated by rotating the region formed by the graphs of $y = x^2$, $y = 2$, and $x = 0$ about the y-axis.

21) Find the volume of the solid that is generated by rotating the region formed by the graphs of $y = x^2$, $y = 2$, and $x = 0$ about the x-axis.

22) Find the volume of the solid that is generated by rotating the region formed by the graphs of $y = 2\sin 2x$, $y = 0$, and $x = 0$ over the interval $[0, \frac{\pi}{2}]$ about the x-axis.
23) Find the volume of the solid that is generated by rotating the region formed by the graphs of \( y = x^2 \) and \( y = 2x \) about the line \( x = 2 \).

24) Find the volume of the solid that is generated by rotating the region formed by the graphs of \( y = 2x^2 \) and \( y = 4x \) about the line \( x = 3 \).

25) Find the volume of the solid that is generated by rotating the region formed by the graphs of \( y = 2x^2 \) and \( y = 4x \) about the line \( y = 10 \).
26) Find the volume of the solid that is generated by rotating the region formed by the graphs of \( y = x^2 \) and \( x = y^2 \) about the line \( y = -1 \).

27) Find the volume of the solid that is generated by rotating the region formed by the graphs of \( y = x^2 \) and \( x = y^2 \) about the line \( x = -4 \).

28) Find the volume of the solid that is generated by rotating the region formed by the graphs of \( y = 6 - x^2 \) and \( y = x^2 + 2x - 6 \) about the line \( y = -7 \).
29) \( R \) is the region bounded by the curves \( y = \tan x, y = \cot x, \) and the \( x \)-axis for \( 0 \leq x \leq \frac{\pi}{2} \).

Find the volume of the solid obtained by revolving \( R \) around the \( x \)-axis. \( \text{(Hint: you may have to divide} \ R \ \text{into 2 regions)} \)

30) Find the volume that remains after a hole of radius 1 is bored through the center of a solid cylinder of radius 2 and height 4.

31) The disk \((x - 4)^2 + y^2 \leq 1\) is revolved about the \( y \)-axis to generate a torus. Find its volume. \( \text{(Hint: } \int_{-1}^{1} \sqrt{1 - y^2} \, dy = \frac{1}{2} \pi, \text{ since it is the area of a semicircle of radius 1.)} \)
Answer Key
Testname: 150C06S06

1) \(\frac{9\pi}{8}\)
2) \(\frac{49\pi^2}{4}\)
3) \(18\pi\)
4) \(\frac{200}{3}\pi\)
5) \(10\pi^2 - 20\pi\)
6) \(28\pi - 7\pi^2\)
7) \(\frac{8}{9}\pi\)
8) \(24\pi\)
9) \(128\pi\)
10) \(32\pi\)
11) \(\pi^2\)
12) \(\frac{49\pi}{2}\)
13) \(\frac{57\pi}{5}\)
14) \(\frac{160\pi}{3}\)
15) \(\frac{640\pi}{3}\)
16) \(\frac{9\pi}{2}\)
17) \(\frac{44\pi}{3}\)
18) \(\frac{2048\pi}{5}\)
19) \(\frac{70\pi}{3}\)
20) \(2\pi\)
21) \(\frac{16\pi\sqrt{2}}{5}\)
22) \(\pi^2\)
23) \(\frac{8\pi}{3}\)
24) \(\frac{32\pi}{3}\)
25) \(\frac{544\pi}{15} \approx 36.27\pi\)
26) \(\frac{19\pi}{30}\)
27) \(\frac{89\pi}{30}\)
28) \(\frac{1625\pi}{3}\)
29) \(2\pi - \frac{\pi^2}{2}\)
30) \(12\pi\)
31) \(8\pi^2\)