

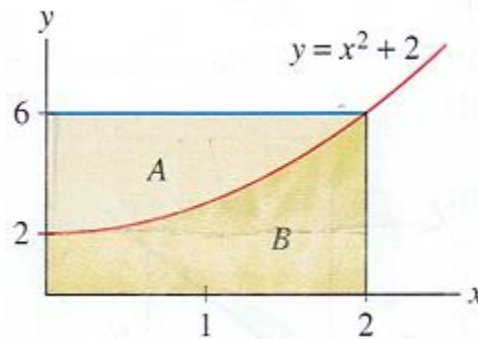
Name: _____

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FINDING VOLUME

(Cross Sections, Disk, Washer and Shell Methods)

- The base is the semicircle $y = \sqrt{9 - x^2}$, where $-3 \leq x \leq 3$. The cross sections perpendicular to the x -axis are squares. (Answer 36π)
- Calculate the volume of a solid obtained by rotating the region under the graph, $f(x)$ about the x -axis.
 - $f(x) = x + 1$, $[0, 3]$ (ans: 21π)
 - $f(x) = \sqrt{x + 1}$, $[1, 4]$ (ans: $21/2\pi$)



In exercises 3 – 5, find the volume of the solid obtained by rotating region A in the above Figure about the given axis.

- x -axis (Answer: $704\pi/15$)
- $y = 2$ (Answer: $128\pi/5$)
- $x = -3$ (Answer: 40π)

In exercise 6 – 8, find the volume of the solid obtained by rotation region B in the above Figure about the given axis.

- x -axis (Answer: $376\pi/15$)
- $y = 6$ (Answer: $824\pi/15$)
- $x = 2$ (Answer: $32\pi/3$) (Hint: Express the volume as a sum of two integrals)

Find the volume of the solid obtained by rotating the region enclosed by the graphs about the given axis.

- $y = x^2$, $y = 12 - x$, $x = 0$ about $y = -2$ (Answer: $\frac{1872\pi}{5}$)
- $y = 16 - x$, $y = 3x + 12$, $x = 0$, about y -axis (Answer: $\frac{4}{3}\pi$) (Hint: Express the volume as a sum of two integrals.)
- $y = x$, $y = \sqrt{x}$ about $y = 1$ (Answer: $\pi/6$)
- $x = y^2$, $x = 1$ about $x = 1$ (Answer: $16/15\pi$)
- The solid lies between planes perpendicular to the x -axis at $x = 0$ and $x = 4$. The cross sections perpendicular to the axis on the interval $0 \leq x \leq 4$ are squares whose diagonals run from $y = -\sqrt{x}$ to $y = \sqrt{x}$. (Answer: 16)

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FINDING VOLUME

(Cross Sections, Disk, Washer and Shell Methods)

Use the shell method to find the volume of the solids obtained by rotating the region enclosed by the graphs of the functions about the y-axis:

1) $y = x^2, y = 8 - x^2, x = 0$ (answer = 16π)

2) $y = x^{1/2}, y = x^2$ (answer = $3\pi/10$)

3) $y = \frac{1}{2} x^2, y = \sin(x^2)$ (answer = 1.322)

Use the shell method to find the volume of the solids obtained by rotating the region underneath the graph of the function over the interval about the given axis:

4) $f(x) = x^3, [0, 1], x = 2$ (answer = $3\pi/5$)

5) $f(x) = x^{-4}, [-3, -1], x = 4$ (answer = $280\pi/81$)