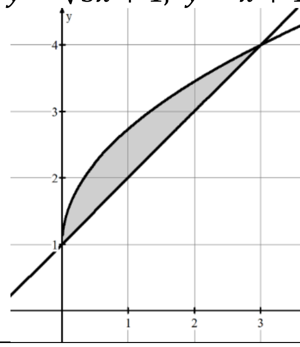
8.7 Volumes with Cross Sections: Squares and Rectangles

Calculus Name: ______________________________ **CA #2**

The bounded region shown for each problem represents the base of a solid. Find the volume of each solid based on the given cross sections. Set up the integral(s) first, then use a calculator to evaluate.

1. Square cross sections perpendicular to the x-axis.

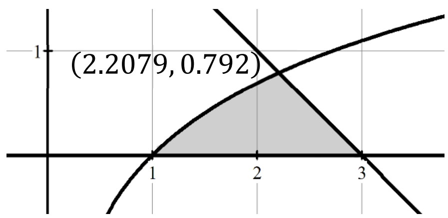
$y = \sqrt{3x} + 1,\ y = x + 1$



2. Square cross sections perpendicular to the y-axis.

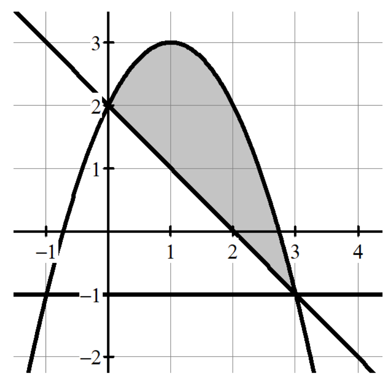
3. Square cross sections perpendicular to the x-axis.

$y = \ln x\,, y = 3 - x$ and the x-axis

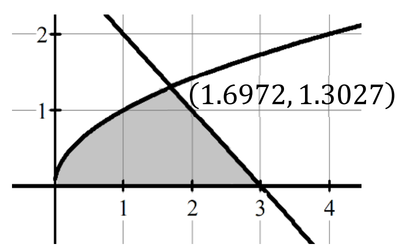


4. Square cross sections perpendicular to the y-axis.

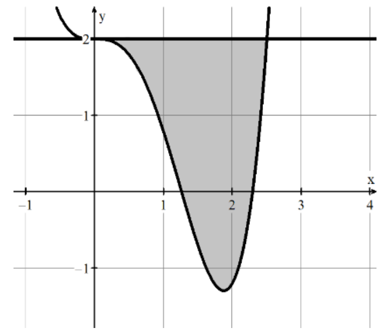
5. A region is bounded by $y = -x^2 + 2x + 3$ and $y = 2 - x$ as shown in the figure. The cross sections perpendicular to the x-axis are rectangles whose height is 5 times the width.



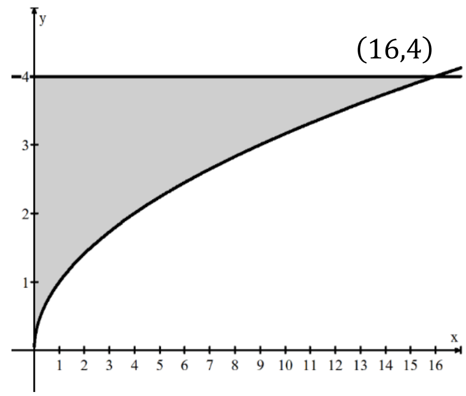
6. The base of a solid is the region bounded by the y-axis, the graphs of $y = \sqrt{x},\ y = 0$, and $y = 3 - x$. For the solid, each cross section perpendicular to the y-axis is a rectangle whose height is 3 times the width.



7. A region is bounded by $y = 0.8x^4 - 2x^3 + 2$ and $y = 2$ as shown in the figure. Each cross section perpendicular to the x-axis is a rectangle whose height is 8.



8. The region bounded by the y-axis, the graph of $y = \sqrt{x}$ and the line $y = 4$ is shown. For the solid, each cross section perpendicular to the y-axis is a rectangle whose height is 3.



9. The graphs of $y = x^2 - x - 3$ and $y = x$ create a bounded region that represents the base of a solid. The cross sections of this solid are perpendicular to the x-axis and form squares. Find the volume of the solid.

Answers to 8.7 CA #2

1. $\int_0^3 \left(\sqrt{3x} - x\right)^2 dx = 0.9$	2. $\int_1^4 \left(y - 1 - \frac{(y-1)^2}{3}\right)^2 dy = 0.9$	3. $\int_1^{2.2079} (\ln x)^2\, dx + \int_{2.2079}^3 (3 - x)^2\, dx \approx 0.469$
4. $\int_0^{0.792} (3 - y - e^y)^2\, dy \approx 1.1837$	5. $\int_0^3 5(-x^2 + 3x + 1)^2\, dx = 100.5$	6. $\int_0^{1.3027} 3(3 - y - y^2)^2\, dy \approx 15.4169$
7. $\int_0^{2.5} 8(-0.8x^4 + 2x^3)^2\, dx = 77.5049$	8. $\int_0^4 3(y^2)\, dy = 64$	9. $\int_{-1}^3 (-x^2 + 2x + 3)^2\, dx = 34.133$