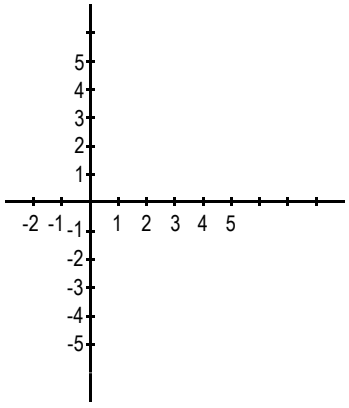
Volumes of Revolution

1. Sketch the region bounded by the lines $y = 3$, $y = 1$, $x = 1$, $x = 6$.

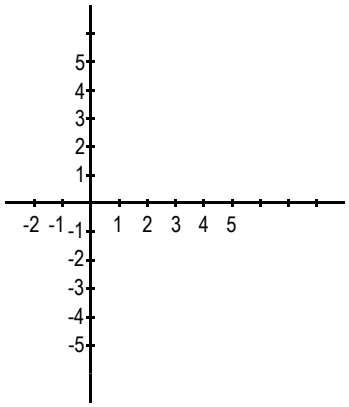
   a)



   b) Determine the perimeter of the region.

   c) Determine the area of the region.

   d) Draw a picture of the region being revolved about the x-axis.

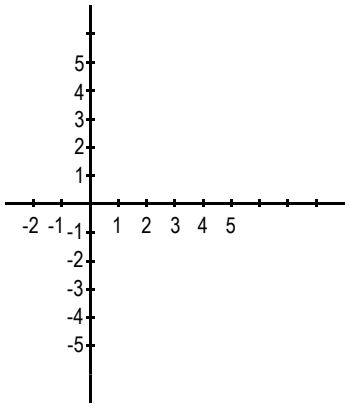


   e) Describe the geometric solid formed by revolving the region about the x-axis.

   f) Determine the volume of the geometric solid.

2. Sketch the region bounded by the lines $y = \frac{3}{4}x - 3, y = 0, x = 0$.

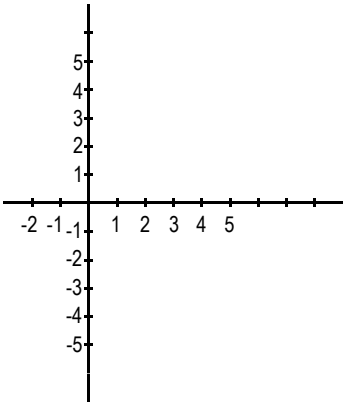
a)



b) Determine the perimeter of the region.

c) Determine the area of the region.

d) Draw a picture of the region being revolved about the *x*-axis.



e) What geometric figure is formed by revolving the region about the *x*-axis?

f) Determine the volume of the geometric solid.

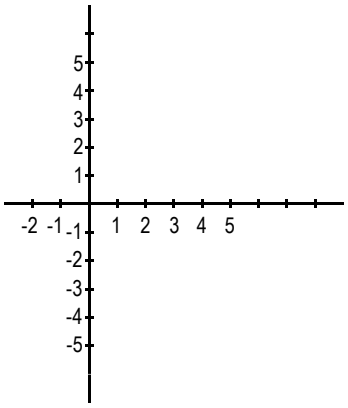
g) Determine the surface area of the geometric solid.

h) If the region were rrevolved about the *y*-axis, would the volume be greater than, less than, or equal to the volume formed by revolving about the *x*-axis? Justify your answer. Compare the surface areas.

i) Name another region that could be revolved about the *x*-axis to create exactly the same geometric solid.

3. Sketch the region bounded by the curve $y = \sqrt{4 - x^2}$ and the line $y = 0$.

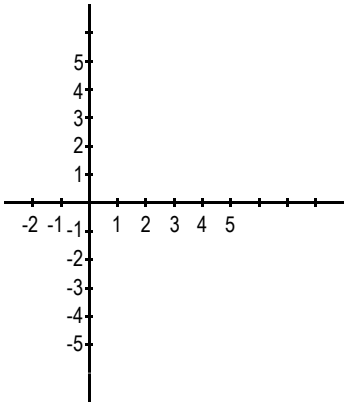
a)



b) Determine the perimeter of the region.

c) Determine the area of the region.

d) Draw a picture of the region being revolve about the *x*-axis.



e) What geometric figure is formed by revolving the region about the *x*-axis?

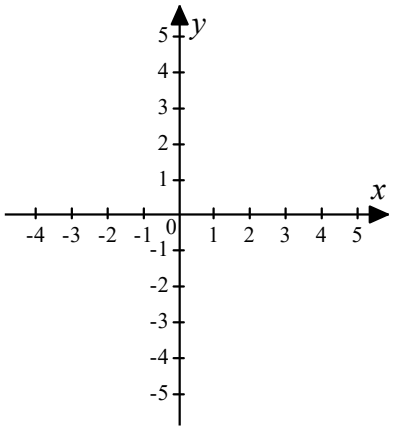
f) Determine the volume of the geometric solid.

g) Determine the surface area of the geometric solid.

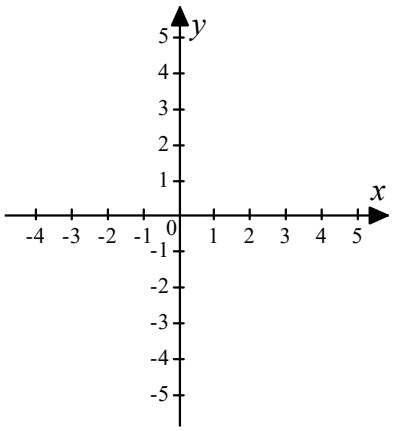
h) If the region were rotated about the *y*-axis, would the volume be greater than, less than, or equal to the volume formed by revolving about the *x*-axis? Justify your answer.

4. A region is bounded by the graphs $y = 3 - \frac{3}{4}(x-2)^2$ and $y = \frac{2}{3}x$.

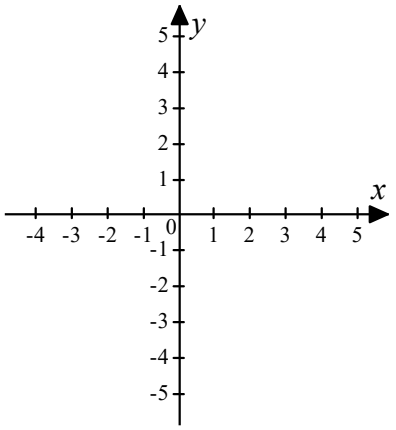
   a) Draw a picture of the region.



   b) Draw a picture of the region rotated around the *x*-axis.



   c) Draw a picture of the region rotated around the *y*-axis.



When drawing a sketch of a solid revolution, use the following procedure:

- Draw the boundaries.
- Shade the region to be revolved.
- Draw the reflection (mirror image) of the region across the axis of revolution.
- Connect significant points and their reflections with ellipses.