# Section 6.4: Volume by Shells

## Warm up:

**Problem 1** *Determine whether you should integrate in terms of $x$ or $y$ in the given scenarios:*

(a) *You are revolving around the $y$-axis and using shells.*

(b) *You are revolving around $y = 2$ and using washers.*

**Problem 2** *Determine whether you should use washers or shells:*

(a) *You are revolving around $x = 3$ and want to integrate in terms of $y$.*

(b) *You are revolving around the $x$-axis and want to integrate in terms of $y$.*

## Group work:

**Problem 3** *Consider the region bounded by $y = 2 - 2x$, $y = 2$, and $x = 1$. Use both the washer and shell method to find the volume of the solid formed by revolving this region around $y = -1$. Do your answers match?*
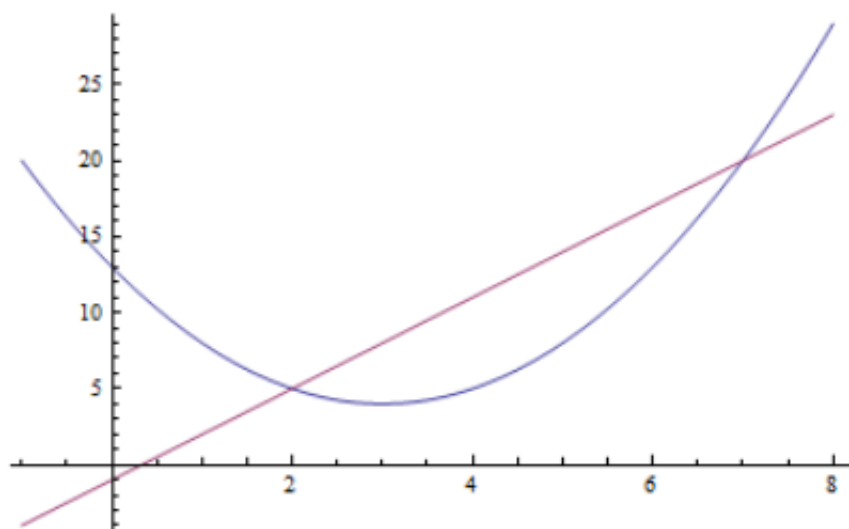
**Problem 4** *Set up an integral that will compute the volume of the solid generated by revolving the region bounded by the curves $y = x^2 - 6x + 13$ (i.e. $x = 3 \pm \sqrt{y - 4}$) and $y = 3x - 1$ about the given axes. Use the best/easier method for each problem.*

Learning outcomes:

(a)  *the x-axis*

(b)  $y = -4$

(c)  $y = 22$

(d)  $x = 9$