

Math 102 — Shell method

Summary. Try each of the following problems together in a small group.

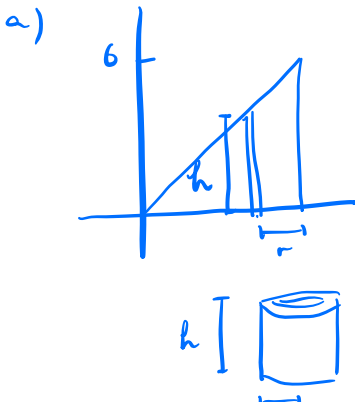
Problem 1. Use the shell method set up an integral to find the volume of the solid formed by revolving each of the following regions around the given axis. If you have time after class, try computing the integrals for practice, but first focus on setting them all up.

- Bounded by: $y = 2x, y = 0, x = 0, x = 3$. Revolved around: $x = 3$.
- Bounded by: $y = -x^2 + 6x$ and the x -axis. Revolved around: y -axis.
- Bounded by: $y = -x^2 + 6x$ and the x -axis. Revolved around: $x = 7$.
- Bounded by: $y = -x^2 + 6x$ and the x -axis. Revolved around: $x = -2$.

Problem 2. The following is a homework problem: consider the region between $y = e^x$ and $y = 0$ for values of x between 0 and 1. Set up an integral for finding the volume of the solid that is formed by revolving the region around each of the following axes. Please use shells. You do not need to compute the integral.

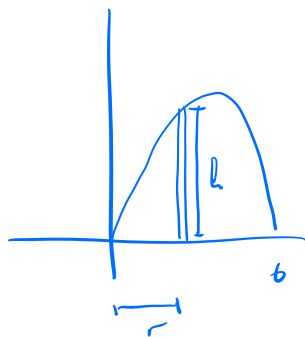
- The y -axis.
- The line $x = 1$.
- The line $x = -1$.
- The x -axis.

Problem 1



$$\begin{aligned} V &= \int_0^3 2\pi r h dx \\ &= \int_0^3 2\pi (3-x)(2x) dx \end{aligned}$$

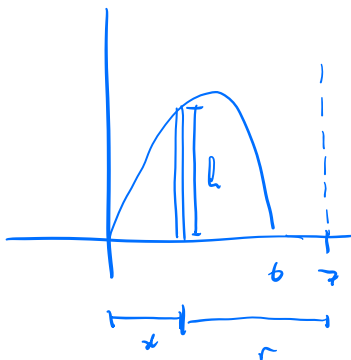
b)



$$V = \int_0^b 2\pi r h dx$$

$$= \int_0^b 2\pi x (-x^2 + 6x) dx$$

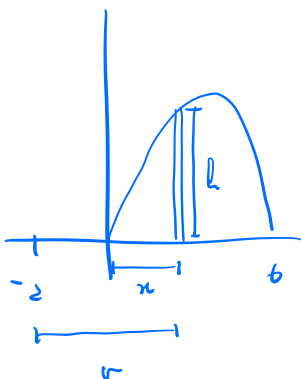
c)



$$V = \int_0^b 2\pi r h dx$$

$$= \int_0^b 2\pi (7-x) (-x^2 + 6x) dx$$

d)



$$V = \int_0^b 2\pi r h dx$$

$$= \int_0^b 2\pi (x+2) (-x^2 + 6x) dx$$