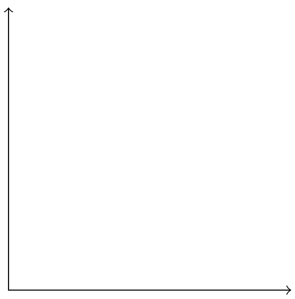
Group members:

Warm-up: write the formula for the volume of a prism and explain its meaning. Draw a picture if you can!

Problem 1. (Example 2.2.7 from Lecture 2.2) Compute the volume of a pyramid with a square base of side length s and a height of h.

Problem 2. (Q26 from Lecture 2.2) Compute the volume of a solid whose base is the region enclosed by $y = \sqrt{x}$ and $y = \frac{x}{2}$ and whose cross sections, perpendicular to the x-axis, are squares.

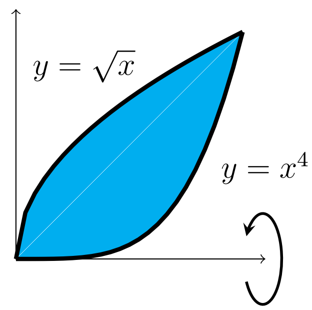
(a) First draw the base region. What are the x-values over which we will need to integrate?



(b) Find a formula for the area of a cross section.

(c) Set up an integral representing the volume of the solid in question and evaluate your integral.

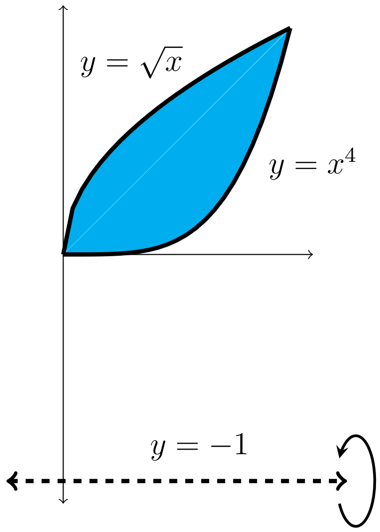
Problem 3. Let S be the solid obtained by rotating the region R around the x-axis.



(a) Write an integral representing the volume of S using the cross section method.

(b) Compute the volume of S.

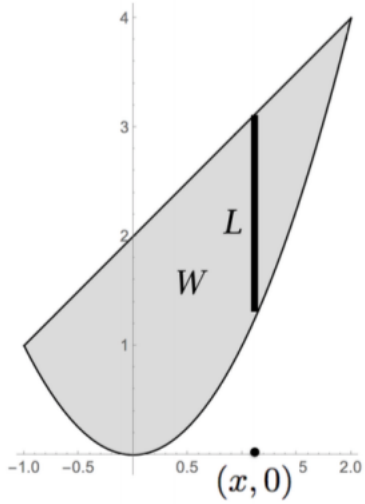
Problem 4. We now work with the solid obtained by rotating R around the line $y = -1$.

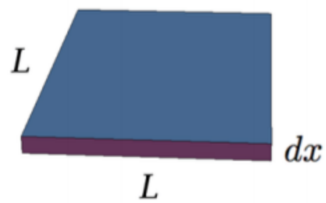


(a) Set up an integral using the cross section method that gives the volume of this solid.

(b) Evaluate the integral you set up to find the volume of this solid.

Problem 5. Pictured below is a plot of the region W bounded by the curves $y = x^2$ and $y = x + 2$. Suppose that W is the base of a cake with cross sections (perpendicular to the x-axis) which are square cake slices.





(a) Make a rough sketch of the cake.

(b) Set up an integral formula yielding the volume of the cake.

(c) Compute the volume of the cake.

Problem 6. Suppose that the region bounded by $y = 6 - x^2$ and $y = x$ is the base of a solid S and that cross sections of S perpendicular to the x-axis are semicircles. Set up an integral formula yielding the volume of S.