

Math 8  
Fall 2019

Written Homework Day 7  
Assigned Monday, September 30

Note: Standard (not preliminary) written homework is graded on your work and your explanations, not just on your answer.

Explanations are important for many reasons. Being able to communicate what you know shows a depth of understanding beyond that of being able to get the right answer to a problem. Doing the mental work of putting explanations into words helps create that depth of understanding. On exams, we will grade your work and not just your answers, so this is good practice for taking exams.

For all these reasons, be sure to: show all your work; explain your reasoning; use clear English; write neatly so all this effort does not go to waste.

Written homework is always due at 10:00 AM on the following Monday.

1. Find a formula for the volume of the region generated by revolving the region given by  $0 \leq x \leq 1$  and  $x^n \leq y \leq 1$  around the  $y$ -axis.

Suggestion: First, sketch this region for the case  $n = 2$ .

Remember that you are revolving around the  $y$ -axis.

2. Call the volume you found in part 1  $V_n$ . What is  $\lim_{n \rightarrow \infty} V_n$ ?

Does this make sense geometrically? Why? (What does the curve  $y = x^n$  for  $0 \leq x \leq 1$  look like when  $n$  is very large?)

Note: The following is not part of the homework. If you wish, you can check your answer to part (1) by noting that for  $n = 1$  the region in question is a (solid) cone, and a cone with height  $h$  and base radius  $r$  has volume  $\frac{\pi r^2 h}{3}$ .