

Math 1231-13: Single-Variable Calculus 1
George Washington University Spring 2024
Recitation 14

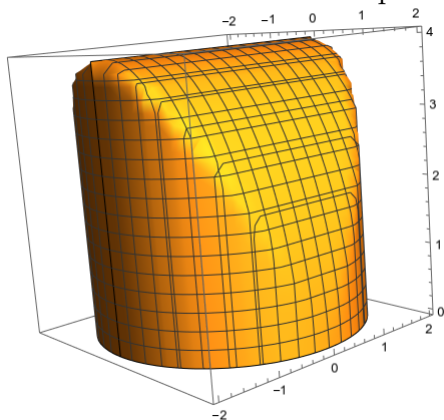
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Problem 1. A 12in spring is stretched to 15in by a force of 75lbs.

- (a) What is the spring constant? What units does it have?
- (b) What is the function that gives force as a function of position? what units does it have?
- (c) What is the work done by stretching the spring from 16in to 20in? What units are your answer in?

Problem 2. Find the volume of a shape whose base is a circle of radius 2, where slices perpendicular to the base are squares.



Problem 3. Let's find the volume of the solid generated by rotating the region bounded by $y = x$ and $y = \sqrt{x}$ about the line $y = 1$.

- (a) Sketch a picture of the region, and draw in the line of revolution.
- (b) Lightly try to sketch what the solid of revolution will look like. Can you describe it in words?
- (c) Sketch in the slices you're going to use. Write down a formula for the volume of one slice. (This should involve a dx).
- (d) Set up an integral that computes the volume of the whole solid.
- (e) Compute the volume.

Problem 4. We want to find the volume of the solid obtained by rotating the region bounded by $xy = 1$, $x = 0$, $y = 1$, $y = 3$ about the x -axis.

- (a) Sketch a picture of this region. Try to visualize what the solid of revolution will look like.
- (b) Try setting up an integral using the washer method. Are we integrating dx or dy ? What's annoying about this setup?
- (c) Now let's set up an integral using the shells method. Here are we integrating dx or dy ? What's harder about this? What's easier?
- (d) Compute one of those integrals.