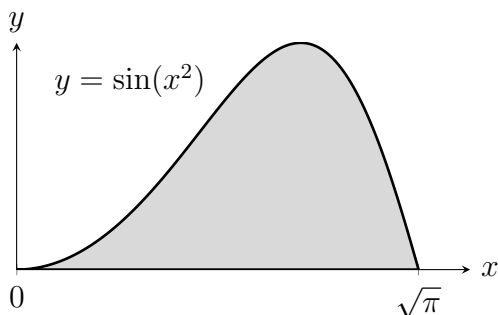


Turn in the following problems at the start of your Thursday recitation section. To receive full credit, please staple your work, and put your name, your section number, and the homework number at the top.

1. Let S be the solid obtained by rotating the region shown in the figure about the y -axis.



- (a) If you were to find the volume of S , would you use the washer method or the method of cylindrical shells? Explain.
- (b) Draw a typical cross-section and label any relevant dimensions.
- (c) What is the volume of S ?
2. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the curves $y = e^{-x^2}$, $y = 0$, $x = 0$, and $x = 1$ about the y -axis. Sketch the region and a typical shell.
3. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the curves $x = 3 + 2y - y^2$ and $x + y = 3$ about the x -axis. Sketch the region and a typical shell.
4. Find the volume obtained by rotating the disk bounded by the graph of the circle

$$x^2 + (y - 1)^2 = 1$$

about the line $x = 2$ in two ways: (a) by the washer method; (b) by the shell method. Are your answers the same?

5. A particle moves back and forth along the x -axis. When it is located a distance of x meters from the origin, a force of $\cos(\pi x/3)$ newtons acts on it. How much work is done in moving the particle from $x = 1$ to $x = 2$? Interpret your answer by considering the work done from $x = 1$ to $x = 1.5$ and from $x = 1.5$ to $x = 2$.
6. If 6 J of work is needed to stretch a spring from 10 cm to 12 cm and another 10 J is needed to stretch it from 12 cm to 14 cm, what is the natural length of the spring?
7. A chain lying on the ground is 10 m long, and its mass is 80 kg. How much work is required to raise one end of the chain to a height of 6 m?