

Name: \_\_\_\_\_ Section: 513 (2:20-3:10)  
 514 (3:55-4:45)  
 515 (5:30-12:20)

This quiz has 3 questions of equal value. 2 points will be given for a correct answer, 1 for mostly correct work (if shown), 0 otherwise.

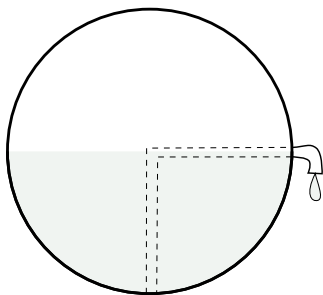
1. The region bounded by  $y = x^2 + 1$ ,  $x = -1$  and  $x = 1$ , is rotated around the  $x$  axis. Find the resulting volume.

Answer: \_\_\_\_\_

2. The region bounded by  $y = x^2 + 1$  and  $y = 2$ , is rotated around the  $y$  axis. Find the resulting volume.

Answer: \_\_\_\_\_

3. A spherical tank of radius 1 is half-empty (or half-full, depending on your mood). Calculate the work needed to empty the tank through a spout that runs horizontally to the center of the sphere. Assume a density of  $\rho$  and a gravitational constant  $g$ .



Answer: \_\_\_\_\_