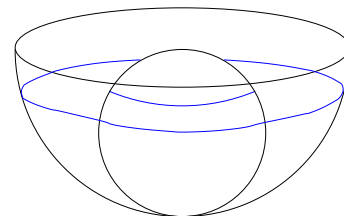


## MAT126, Paper Homework “Bowl”

1. A spherical ball of radius 2” is placed in a bowl in the shape of a half-sphere of radius 4”. If the bowl is filled with water to a depth of 3”, calculate the volume of water needed.

Hint: Think of the bowl as being described by rotating part of the circle  $x^2 + (y - 4)^2 = 16$  around the  $y$ -axis, and the ball as being obtained by revolving the circle  $x^2 + (y - 2)^2 = 4$  around the  $y$ -axis.



2. Write an integral that represents the length of the curve  $y = \sin(x)$  for  $0 \leq x \leq \pi$ .

Use Simpson’s rule with  $n = 4$  to approximate the value of the integral, correct to within  $\pm 0.001$ . (You can write an answer involving  $\pi$  and square roots, or a decimal approximation. But show how you got it.)