

## Homework IV

1. Find the length of the curve  $x = \frac{1}{4}y^2 - \frac{1}{2} \ln y$  for  $1 \leq y \leq 2$ .
2. Find the area of the surface obtained by rotating the curve  $y = x^3$  about the  $x$ -axis for  $1 \leq x \leq 3$ .
3. Find the area of the surface obtained by rotating the curve  $x = \sqrt{1 + e^y}$  about the  $y$ -axis for  $0 \leq y \leq 3$ .

4. Find the volume of the solid obtained by rotating about the  $x$ -axis the region between the curves  $y = \sqrt{\sin(x)}$  and  $y = \sin(x)$  on the interval  $[0, \pi]$ .

5. Find the volume of the solid obtained by rotating about the  $y$ -axis the region between the curves  $y = \sin^2(x)$  and  $y = \sin(x)$  on the interval  $[0, \pi]$ .

6. A parfait cup is formed by revolving the curve  $y = x^3$ ,  $0 \leq x \leq 2$ , about the  $y$ -axis. The parfait cup is filled to the brim with hot chocolate. If you plan to drink exactly half the hot chocolate in the cup, at what height should the liquid be when you stop drinking?

7. A hemispherical tank with a radius of 7 feet is filled to a height of 6 feet with gasoline. How much work is required to pump all the gasoline over the top? The weight-density of gasoline is  $42 \text{ lb/ft}^3$ .

8. A chain lying on the ground is 8 m long and its mass is 96 kg. How much work is required to raise one end of the chain to a height of 10 m? (Hint: See Example 4 in Section 6.4 of the textbook.)