

**Calculus Worksheet #2 Unit 12 page 1** \_\_\_\_\_

**Use calculus to find the total amount of work done in each of the following problems. Where appropriate, express your answers rounded to 3 significant figures.**

**1. A water tank is in the shape of a right, circular cylinder with axis vertical. The tank is 30 feet tall and has a radius of 10 feet. The tank is empty initially, but water is pumped from a near-by lake through a pipe that goes into the bottom of the tank. If the bottom of the tank is 50 feet above the surface of the lake, then how much work is done in filling the tank. (Assume that a cubic foot of water weighs 62.4 pounds.)**

**2. Suppose that a large spring has a natural length of 3 feet and that a force of 20 pounds is needed to stretch it to a length of 3.5 feet. How much work is being done in stretching the spring from a length of 3.5 feet to a length of 4 feet? (According to Hook's Law, the force required to stretch the spring is directly proportional to the distance the spring is stretched.)**

## Calculus Worksheet #2 Unit 12 page 2

Use calculus to find the total amount of work done in each of the following problems. Where appropriate, express your answers rounded to 3 significant figures.

3. A 500 pound barrel is lifted to the top of a 100 foot tall building using a cable that weighs 10 pounds per foot. How much work is done?

4. A water tank is in the shape of a hemisphere with a radius of 30 feet. If the water is initially 20 feet deep, then find the work done when all of the water is pumped out of the top of the tank.