

Calculus Class Worksheet #1 Unit 12

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 cone with axis vertical. The tank is 40 feet tall, and the top has a radius of 30 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 80 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 10 pounds is needed to compress it to a length of 2.8 feet. How much work is being done in compressing the spring from a length of 2.8 feet to a length of 2.2 feet? (According to Hook's Law, the force required to compress the spring is directly proportional to the distance the spring is compressed.)