

# Spring 2012 Math 152

## Week in Review 3

*courtesy: Amy Austin*  
(covering section 7.3-7.4)

### Section 7.3

1. Find the volume of the solid obtained by rotating the region bounded by the given curve(s) about the specified axis.

a.)  $y = \frac{1}{x^2}$ ,  $x = 2$ ,  $x = 4$ ,  $y = 0$  about the  $y$  axis.

b.)  $y = x^2$ ,  $y = 16$ ,  $x = 0$  about the  $x$ -axis.

c.)  $y = x^2$ ,  $y = 3x$ . Rotate around the  $y$  axis.

d.)  $y = x^3$ ,  $y = 0$ ,  $x = 1$ ,  $x = 2$ . Rotate around the line  $x = -1$ .

e.)  $y = \sqrt{x}$ ,  $x = 0$ ,  $x = 4$ ,  $y = 0$ . Rotate around the line  $y = 3$ .

f.)  $y = \cos x$ ,  $y = 0$ ,  $x = 0$ ,  $x = \frac{\pi}{2}$ . Rotate around the line  $y = 1$ . Now rotate around the line  $x = \frac{\pi}{2}$ .  
Do not evaluate either integral.

### Section 7.4

2. How much work is done in lifting a 30 lb barbell from the floor to a height of 4 feet?
3. When a particle is at a distance  $x$  meters from the origin, a force of  $f(x) = 3x^2 + 2$  Newtons acts on it. How much work is done in moving the object from  $x = 2$  to  $x = 4$ ?
4. A spring has a natural length of 6 inches. If a 5-lb force is required to maintain it to a length of 18 inches, how much work is required to stretch it from 1 foot to 3 feet?
5. Suppose 2 N of work is needed to stretch a spring 1 meter beyond its natural length. How much work is done in stretching this spring 3.5 m beyond its natural length?
6. A heavy rope, 50 feet long, weighs 0.5 pounds per foot and hangs over the edge of a building 120 feet high. There is a 85 pound weight attached to the end of the rope. How much work is done in pulling the rope to the top of the building?
7. A 200 pound cable is 300 feet long and hangs vertically from the top of a tall building. How much work is required to pull 20 feet of the cable to the top of the building?
8. An aquarium 10 m long, 2 m wide and 1 m deep is full of water. Find the work required to pump half the water to the top of the aquarium.
9. A tank contains water and has the shape of a trough 6 feet long. The end of the trough is an isosceles triangle with height 3 feet and base length 4 feet. The vertex of the triangle is at the bottom. Find the work required to pump all of the water to the top of the tank.
10. A tank in the shape of sphere with radius 4 m is half full of water. The water is pumped from a spout at the top of the tank that is 1 m high. Find the work done in pumping the water through the spout.