Spring 2013 Math 152

Week in Review 3
courtesy: Amy Austin
(covering section 7.3-7.4)

Section 7.3

1. First, let's recap the disk and washer method:

   a.) Find the integral that gives the volume of the solid obtained by rotating the region bounded by $y = x^3$, $y = 0$, $x = 0$ and $x = 2$ about the x axis. Do not integrate.

   b.) Find the integral that gives the volume of the solid obtained by rotating the region bounded by $y = x^3$, $y = 0$, $x = 0$ and $x = 2$ about the y axis. Do not integrate.

   c.) Find the integral that gives the volume of the solid obtained by rotating the region bounded by $y = x^2$ and $x = y^2$ about the line $x = 2$. Do not integrate.

   d.) Find the integral that gives the volume of the solid obtained by rotating the region bounded by $y = x^2 + 1$, $y = 5$ about the line $y = 5$. Do not integrate.

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

   a.) $y = 10x - x^2$, $y = 0$ about the y axis.

   b.) $y = x^2$, $y = 3x$, about the y axis.

   c.) $y = x^3$, $y = 0$, $x = 1$, $x = 2$, about the line $x = -1$.

   d.) $y = \sqrt{x}$, $x = 0$, $x = 4$, $y = 0$, about the line $y = 3$.

   e.) $y = x^2$ and $y = 4 - x^2$, about the line $x = \sqrt{2}$.

Section 7.4

3. How much work is done in lifting a 30 lb barbell from the floor to a height of 4 feet?

4. 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 $x = 4$?

5. 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?

6. 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?

7. A heavy rope, 50 feet long, weighs 0.5 pounds per foot and hangs over the edge of a building 120 feet high. How much work is done in pulling the rope to the top of the building?

8. 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?

9. 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.

10. 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.

11. 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.

12. A tank in the shape of cone with radius 1 inch and height 15 inches is full of water to a depth of 7 inches. Find the work done in pumping the water to the top of the tank.