Summer 2016 Math 152

Week in Review 1

courtesy: Amy Austin

(covering 7.1-7.4)

Section 7.1

1. Sketch the region bounded by the given curves and find the area of this region.

   a.) $y = x^2 + 1$ and $y = 3 - x^2$

   b.) $x + y^2 = 2$, $x + y = 0$

   c.) $y = 2\cos x$, $y = 16e^{4x}$, $x = 0$, $x = \dfrac{\pi}{2}$

   d.) $y = x^2 + 1$, $y = 3 - x^2$, $x = -2$, $x = 2$

2. Find the area of the region bounded by the parabola $y = x^2$, the tangent line to this parabola at $(1, 1)$ and the x-axis.

Section 7.2 and 7.3

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

   a.) $y = \sqrt{x-1}$, $x = 2$, $x = 5$, $y = 0$ about the x axis.

   b.) $y = e^x$, $y = 0$, $x = 0$, $x = 1$ about the x axis.

   c.) $y = x^4$, $y = 1$, about the line $y = 2$

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

   e.) Same as d, but revolve around the y axis.

   f.) $y = \dfrac{1}{x}$, $y = 0$, $x = 1$, $x = 10$. Rotate around the y axis.

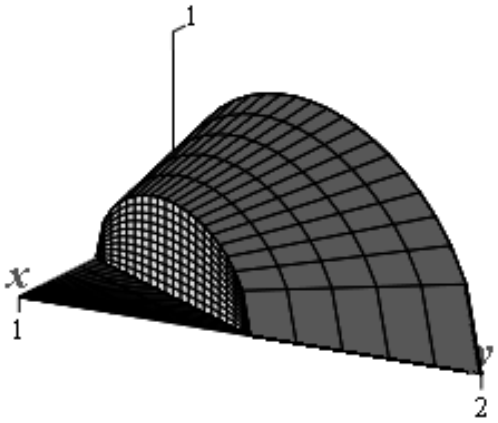
   g.) $y = 2x - x^2$, $y = 0$. Rotate around the y axis.

   h.) $x = \sqrt[4]{y}$, $x = 0$, $y = 16$. Rotate around the x axis.

   i.) $y = \sqrt{x}$, $y = 0$, $x + y = 2$. Rotate around the x axis.

   j.) $y = x^2$, $y = 0$, $x = 1$, $x = 2$. Rotate around the line $x = 4$.

4. Find the volume of the solid S whose base is the triangular region with vertices $(0, 0)$, $(1, 0)$ and $(0, 2)$. The cross sections of S perpendicular to the x-axis are semi-circles.



5. Find the volume of the solid S whose base is the ellipse $x^2 + \dfrac{y^2}{4} = 1$. The cross sections of S perpendicular to the y-axis are squares.

6. Find the volume of the solid S whose base is the region bounded by the parabola $y = x^2$ and $y = 1$. The cross sections of S perpendicular to the y-axis are equilateral triangles.

Section 7.4

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

8. 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 $x = 4$?

9. 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?

10. 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?

11. 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?

12. 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?

13. 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.

14. 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.

15. 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.

16. 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.