Math 1411 **Worksheet 4**

1. State the definition of
   (a) area between two functions f and g
   (b) volume of a solid of revolution, using the methods of disks
   (c) volume of a solid of revolution, using the methods of shells
   (d) arc length of a curve represented by a function f
   (e) surface of revolution of a solid rotated around the x axis
   (f) work done by a force F from $x = a$ to $x = b$
   (g) the center of mass of a planar lamina of uniform density ρ bound by the graphs of $f(x)$ and $g(x)$.

2. Find the area bounded by $y = \frac{1}{x^2}$, $y = 0$, $x = 1$, $x = 5$.

3. Find the area bounded by $y = \sqrt{x-1}$, and $y = \frac{x-1}{2}$

4. Find the volume of the solid generated by revolving the plane region bounded by $y = \sqrt{x}$, $y = 2$, and $x = 0$ around (a) the x axis and (b) the y axis.

5. Consider the region bounded by $y = x\sqrt{x+1}$ and $y = 0$ and find (a) the area of the region, (b) the volume of the solid generated by revolving it around the x axis, (c) volume of the solid generated by revolving it around the y axis, (d) the surface area of the solid generated by revolving it around the x axis (you don't need to evaluate this one)

6. Find the arc length of $f(x) = \frac{4}{5}x^{5/4}$, $x \in [0, 4]$. *Note: you might need to use Maple to evaluate the resulting integral*

7. Find the surface area of the region bounded by the graphs of $y = \frac{1}{2}x^2$, $y = 0$, and $x = 3$ as it revolves around the x axis.

8. Find the work done in stretching a spring from its natural length of 10 inches to a length of 15 inches, if a force of 4 pounds is needed to stretch it 1 inch.

9. Find the center of mass for the lamina of uniform density ρ bounded by $y = \sqrt{x}$ and $y = x$.

10. Find the center of mass for the lamina of uniform density ρ bounded by $y = \sqrt{1-x^2}$ and $y = -\sqrt{1-x^2}$