

**Math 101B Chapter 5**

Name \_\_\_\_\_

*Follow directions each problem is worth 10 points.***I. Set up integrals for the following. DO NOT integrate or simplify on this page.**Consider the region bounded by  $y = \ln x$ ,  $y = 0$ ,  $x = 3$ 

1. Graph the region and find the length of the arc in the region.
2. Find the volume if cross sections perpendicular to the x-axis are squares.
3. Find the volume and surface area if the region is rotated around the x-axis.
4. Find the volume if the region is rotated around the y-axis.
5. Find the volume if the region is rotated around  $x = 5$ .
6. Find the x-coordinate for the centroid of the region.

**II. Find the approximate values for the following. Use fnint to evaluate integrals.**The region bounded by  $y = x^4$ ,  $x = 0$ ,  $y = 16$  is rotated  $180^\circ$  around the y-axis with glass sealed into the front to form a tank. If it is filled with water (62.4 lbs/cubic feet),

1. Find the pressure on the front of the tank.
2. Find the work needed to pump the tank to a point 5 feet above the tank.

**III. A cannon ball is shot with a velocity of 88 f/s at an angle of  $40^\circ$  from a point 15 feet above the ground.**

1. Find the time of flight and the horizontal range of the cannon ball.
2. What is the maximum height reached by the cannon ball?