HOMEWORK 2 - MATH 152

DUE DATE: Tuesday, September 21
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Sketch the region enclosed by the curves $x^2 = y$ and $x = y - 2$ and find its area.

2. (a) Find the area of the region enclosed by the parabola $y = 2x - x^2$ and the x-axis.

   (b) Find the value m so that the line $y = mx$ divides the region in part (a) into two regions of equal area.

3. Find the volume of the solid that results when the region enclosed by the given curves is revolved around the x-axis:

   (a) $y = x^2, y = x^3$

   (b) $y = \frac{e^{3x}}{\sqrt{1+e^{6x}}}, x = 0, x = 1, y = 0$

4. Find the volume of the solid that results when the region enclosed by $y = \sqrt{x}, y = 0$ and $x = 9$ is revolved around the line $y = 3$.

5. Use cylindrical cells to find the volume of the solid generated when the region enclosed by the curves $y = e^{x^2}, x = 1, x = \sqrt{3}, y = 0$ is revolved around the y-axis.

6. The region enclosed between the curve $y^2 = kx$ and the line $x = \frac{1}{4}k$ is revolved about the line $x = \frac{1}{2}k$. Use cylindrical cells to find the volume of the resulting solid. (Assume $k > 0$.)

7. (a) Find the exact arc length of the curve $y = \frac{x^6+8}{16x^2}$ from $x = 2$ to $x = 3$. (It would be nice if you would also graph it using your calculators and make a sketch of the graph over $[2, 3]$.)

   (b) Find the exact arc length of the parametric curve $x = \cos t + t \sin t, y = \sin t - t \cos t,\ 0 \leq t \leq \pi$, without eliminating the parameter.

8. (a) Find the area of the surface generated by revolving the curve $x = y^3, 0 \leq y \leq 1$, about the y-axis.

   (b) Show, by revolving the semicircle $y = \sqrt{r^2 - x^2}$ about the x-axis, that the area of the surface of a sphere of radius r is $4\pi r^2$.