MAT 137 **HW #4** Name _____

2/26/09 (due Monday 3/2/09)

10 points

Show work or otherwise justify your answers. Unsupported answers (i.e. calculator output) will not receive full credit. You may check your answers with a calculator or computer.

1. Determine whether or not the improper integral converges. If convergent, find the value.

   (a) $\displaystyle\int_2^\infty \frac{1}{x^2-1}\,dx$

   (b) $\displaystyle\int_0^1 \frac{1}{x^2-1}\,dx$

2. Find the length of the curve $y = \ln(\cos(x)),\ 0 \le x \le \dfrac{\pi}{3}$.

3. (a) Find the centroid of the region R described by the system of inequalities $x^2 \leq y \leq 4,\ x \geq 0$.

(b) Use your answer to (a), and Pappus' Theorem, to find the volume of the solids obtained by rotating the region R about (i) the y-axis, and (ii) the x-axis.

(c) Use Pappus' Theorem, and the formula for the volume of a sphere, to find the centroid of the quarter circle given by $x^2 + y^2 \leq r^2,\ x \geq 0,\ y \geq 0$ without integrating.