Math 200 Quiz #6 25 points Name:____

1) Use polar coordinates to evaluate $I = \int_{-4}^{4}\int_{0}^{\sqrt{16-x^2}} \tan^{-1}\left(\frac{y}{x}\right) dydx$. (4 points)

2) Find $\bar{y}$, the y-coordinate of the center of mass of the lamina that is bounded by $1 \le x^2 + y^2 \le 4$ in the first quadrant (x and y are both nonnegative.) The density of the lamina is $\delta(x, y) = x$ grams per cm^2. (5 points)

3) Find I_0, the moment of inertia about (0, 0), for the lamina that is bounded by $1 \le x^2 + y^2 \le 4$ if the density of the lamina is $\delta(x, y) = x^2$ grams per cm^2. (4 points)

4) Use spherical coordinates to evaluate I = $\iiint_E z\,dV$ if E is the solid that lies **below** the plane z = 2 and **above** the cone $\phi = \frac{\pi}{3}$. (6 points)

5) Use **Green's Theorem once** to evaluate $\int_C \vec{F} \cdot d\vec{s}$ if $\vec{F} = \langle xy, y \rangle$ and C is the closed curve that rotates once counterclockwise about the triangle with vertices (2, 0), (2, 4), and (0, 4). (6 points)