Math 2043, Calculus III, Prof. Gutiérrez **Quiz 6, Due June 22, 2009**

NAME: _____ **SECTION:**_____

1. Use polar coordinates to compute the integral

$$\iint_D \sqrt{x^2+y^2}\,\cos\sqrt{x^2+y^2}\,dA,$$

where D is the region in the first quadrant enclosed by the circles $x^2+y^2=\pi^2$ and $x^2+y^2=\pi^2/4$.

2. Use polar coordinates to find the volume of the solid in the first octant bounded above by the sphere $x^2+y^2+z^2=16$, and below by the cone $z=\sqrt{x^2+y^2}$.

3. Use polar coordinates to compute $\displaystyle\int_0^1\int_0^{\sqrt{1-y^2}} \sin(x^2+y^2)\,dx\,dy$.

4. Show that the equation $r=3\sin\theta$ represents the equation of a circle in polar coordinates. Find the radius and center of the circle.

5. Show that the circle C with equation $(x-1)^2+y^2=1$ has polar equation $r=2\cos\theta$. Using this and integration in polar coordinates find the area of the region bounded by the circle of radius 2 with center $(0,0)$ outside C in the first quadrant.