Quiz 5
Math 231
February 28, 2007

Name:

Be sure to show all work.

1. (a) Convert the equation $x^2 - y^2 = 25$ to polar coordinates.
   SOLUTION: $r^2 \cos^2 \theta - r^2 \sin^2 \theta = 25$.

   (b) Convert the equation $\theta = \frac{\pi}{4}$ to rectangular coordinates.
   SOLUTION: $\tan \theta = \frac{y}{x} = 1$, and the line goes through the origin, so the equation becomes $y = x$.

2. Draw the graph of the curve $r = 1 + 2 \sin \theta$. Label all points where the curve intersects the $x$- and $y$-axes.

3. Find the area bounded by the curve $r = \cos \theta$.
   SOLUTION:
   
   $\int_{0}^{\pi} \frac{\cos^2 \theta}{2} d\theta = \int_{0}^{\pi} \frac{1 + \cos(2\theta)}{4} d\theta$
   
   $= \frac{\theta}{4} + \frac{\sin(2\theta)}{8} \bigg|_{0}^{\pi}$
   
   $= \frac{\pi}{4} + 0 - [0 + 0]$  
   
   $= \frac{\pi}{4}$