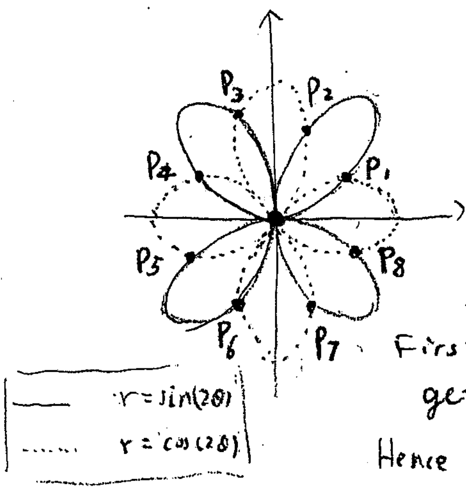
Math 1172 - Autumn 2015 Name: ______________________

Quiz 7 - Take Home Recitation Instructor: ______________________

SHOW ALL WORK!!! Unsupported answers might not receive full credit. Use the back of this sheet for additional workspace.

**Problem 1** [2 pts] Find all points of intersection for the polar curves $r = \sin(2\theta)$ and $r = \cos(2\theta)$.

$r=\sin(2\theta)$ and $r=\cos(2\theta)$ represent roses with four petals. The entire curves are generated as $\theta$ increases from 0 to $2\pi$.




From the figure we should have 8 points of intersection. From the way one graphs the two curves, some points of intersect are not achieved by the same $\theta$-value. So we need to use some symmetry. First solve $\sin(2\theta)=\cos(2\theta)$ or $\tan(2\theta)=1$ to get $2\theta=\frac{\pi}{4}$ or $\theta=\frac{\pi}{8}$, so $r=\sin(2\cdot\frac{\pi}{8})=\frac{\sqrt{2}}{2}$.

Hence $P_1(\frac{\sqrt{2}}{2},\frac{\pi}{8})$, $P_2(\frac{\sqrt{2}}{2},\frac{3\pi}{8})$, $P_3(\frac{\sqrt{2}}{2},\frac{5\pi}{8})$, $P_4(\frac{\sqrt{2}}{2},\frac{7\pi}{8})$, $P_5(\frac{\sqrt{2}}{2},\frac{9\pi}{8})$, $P_6(\frac{\sqrt{2}}{2},\frac{11\pi}{8})$, $P_7(\frac{\sqrt{2}}{2},\frac{13\pi}{8})$, $P_5(\frac{\sqrt{2}}{2},\frac{15\pi}{8})$, and the origin are all points of intersection.

**Problem 2** [2 pts] The equation of a certain polar curve is $r\sec\theta = 4$.

a) Find a description of the curve in terms of $x$ and $y$.

$$r\sec\theta = 4 \Rightarrow r = 4\cos\theta \Rightarrow r^2 = 4r\cos\theta$$

With $r^2 = x^2+y^2$ and $x = r\cos\theta$, we get

$$x^2+y^2 = 4x$$
$$\Leftrightarrow x^2-4x+y^2=0$$
$$\Leftrightarrow x^2-4x+4+y^2=4$$
$$\Leftrightarrow (x-2)^2+y^2=2^2$$

b) Fill in the blanks:

The curve is a <u>Circle</u> of radius <u>2</u>. (centered at (2,0))