Math 2315 - Calculus II

Homework #9 - 2007.10.21

Due Date - 2007.10.30

Name: ______________________

Part 1: Problems from sections 10.3 - 10.6

Part 2: The *fun* problems.

1. Let $P_0 = (d, \alpha)$ be polar coordinates of the point on the line L closest to the origin. Show that L has the polar equation $r = d\sec(\theta - \alpha)$.

2. Identify the curve with polar equation $r = 2a\cos(\theta)$, where a is constant.

3. Find the area of the region between the inner and outer loops of the Limaçon defined by $r = 2\cos(\theta) - 1$.

4. If (x, y) has polar coordinates (r, θ), find the coordinates of the following:

a) $(x, -y)$

b) $(-x, -y)$

c) $(-x, y)$

d) (y, x)

e) $(2x, 2y)$

5. Find the polar equation of the line $y = mx + b$.

6. Prove that the total area of the four petal rose defined by $r = \sin(2\theta)$ is equal to half the area of the circle of radius 1.

7. Why does the circle $r = \sin(\theta)$ lie inside the spiral $r = \theta$? Calculate the area between the two polar curves in the first quadrant.

8. Find the area of the region that lies inside one, but not both of the curves $r = 2 + \sin(2\theta)$ and $r = 2 + \cos(2\theta)$.