Math 12 **Name (Print):** _____

Fall 2013 - Exam 4: §8&11 - 11/14/13 - Write all responses on separate paper. Show your work for credit.

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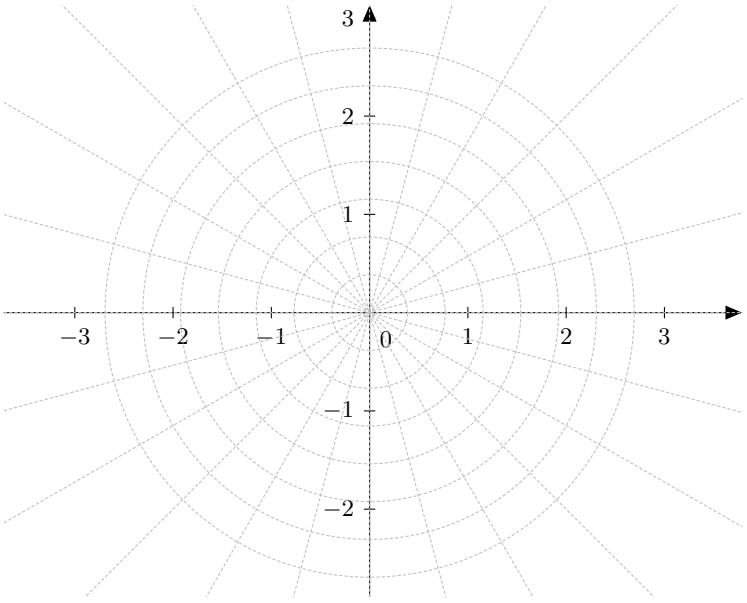
1. Convert the rectangular equation to polar coordinates and solve for r.
   (a) $x^2 + (y-4)^2 = 16$
   (b) $(x^2 + y^2 + y)^2 = 4(x^2 + y^2)$

2. Convert the polar equation to rectangular coordinates and solve for y.
   (a) $r = \dfrac{1}{\sin\theta + \cos\theta}$
   (b) $r = \sec\theta(\tan\theta - 1)$

3. Consider the polar function $r = \dfrac{2}{1 - \sin\theta}$
   (a) Test the function for symmetry. What do you find?
   (b) Write the function as a conic section in standard rectangular form.
   (c) Complete the table below for r, x, and y for the given θ

θ	0	$\frac{\pi}{6}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{3\pi}{2}$	$\frac{11\pi}{6}$
r							
x							
y							

   (d) construct a graph for the function.



4. Find all solutions to each equation, including the complex solutions. *Hint: first convert the number to polar form and use DeMovire's theorem.*
   (a) $x^5 = -1$
   (b) $x^6 = 8 + 15i$

5. Consider the ellipse described by $\dfrac{(x-4)^2}{25}+\dfrac{y^2}{9}=1$
   (a) Find the center, x-intercepts, y-intercepts and the coordinates of the foci.
   (b) Sketch a graph showing these features.
   (c) What is the eccentricity, $e=\dfrac{c}{a}$?
   (d) What is the polar form? *Hint: it's in the* $r=\dfrac{ed}{1-e\cos\theta}$ *form*

6. Consider the hyperbola describe described by $r=\dfrac{10}{2-3\sin\theta}$
   (a) Find the eccentricity.
   (b) Complete the table:

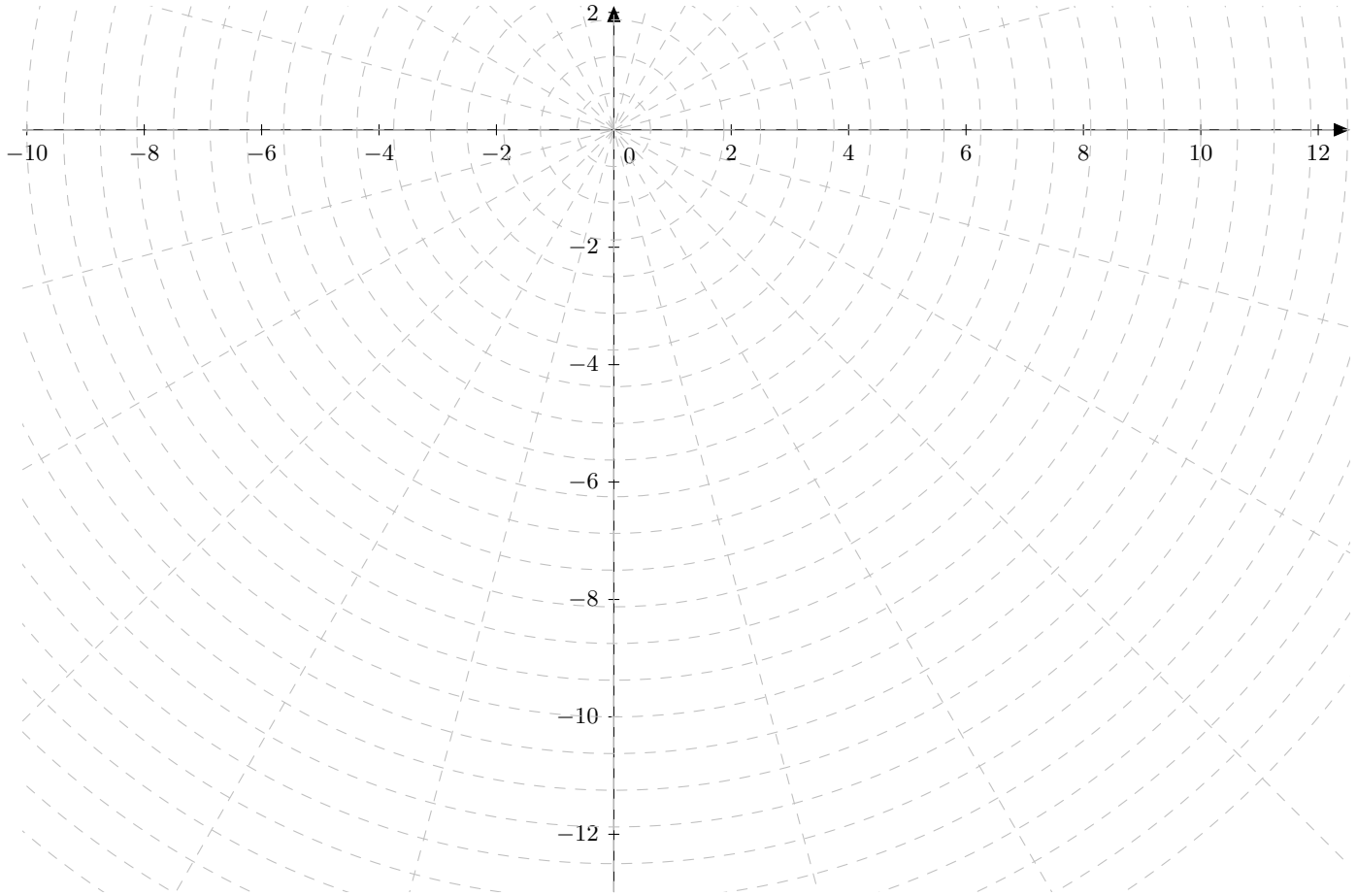
θ	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	$\arcsin\left(-\frac{12}{13}\right)$	$\pi-\arcsin\left(-\frac{12}{13}\right)$
r						
x						
y						

   (c) Given that the vertices of the hyperbola are the y-intercepts what are the coordinates of the center?
   (d) (4 points) Sketch a graph (see attached graph paper).
   (e) (4 points) What is the rectangular form?

7. Find parametric equations for each given conic.
   (a) $\dfrac{x^2}{4}+\dfrac{(y-1)^2}{9}=1$
   (b) $(x-1)^2-y^2=1$
   (c) $4(y-1)=(x-2)^2$

8. Make a table of values and sketch a graph for the given parametric equations.

$$x=\cos(t) \tag{1}$$
$$y=\sin^2(t) \tag{2}$$


2
−10
−8
−6
−4
−2
0
2
4
6
8
10
12
−2
−4
−6
−8
−10
−12