

Name: \_\_\_\_\_

Period: \_\_\_\_\_

**Precalculus H/GT**  
**Practice Problems: Conics**

1. Convert each of the following rectangular points to polar form  $(r, \theta)$ , with  $r \geq 0$  and  $\theta \in [0, 2\pi)$ .
  - (a)  $(0, -6)$
  - (b)  $(-4\sqrt{3}, -12)$
  - (c)  $(3, -6)$
2. Convert each of the following polar points to rectangular form  $(x, y)$ .
  - (a)  $(6, \pi)$
  - (b)  $(24, -\frac{5\pi}{6})$
  - (c)  $(-8, \frac{5\pi}{3})$
3. Convert the following Polar equations to Rectangular equations. Write  $y = f(x)$  if possible.
  - (a)  $\theta = \frac{\pi}{6}$
  - (b)  $r = \frac{1}{3\cos\theta}$
  - (c)  $\sin 2\theta = \cos 2\theta$
  - (d)  $r^2 = \sin 2\theta + \cos 2\theta$
  - (e)  $r = \csc\theta - \sin\theta$
4. Convert the following Rectangular equations to Polar equations. Write  $r = f(\theta)$  if possible.
  - (a)  $x^2 + (y - 2)^2 = 4$
  - (b)  $y = -\frac{4}{3}x + 2$
  - (c)  $(x^2 + y^2)^2 = 3x$
  - (d)  $xy^2 = 8$
  - (e)  $\frac{1}{x} + \frac{1}{y} = 5$
5. Graph and name the following Polar equations.
  - (a)  $r = 4 - 3\sin\theta$
  - (b)  $r = \frac{1}{2\sin\theta + 3\cos\theta}$
  - (c)  $r = 5\cos 4\theta$
  - (d)  $r = \frac{1}{3}\theta$
  - (e)  $r = 6\sin\theta$
  - (f)  $r^2 = 8\sin\theta\cos\theta$
  - (g)  $r = 2 + 5\cos\theta$
  - (h)  $r = 5 + 2\cos\theta$

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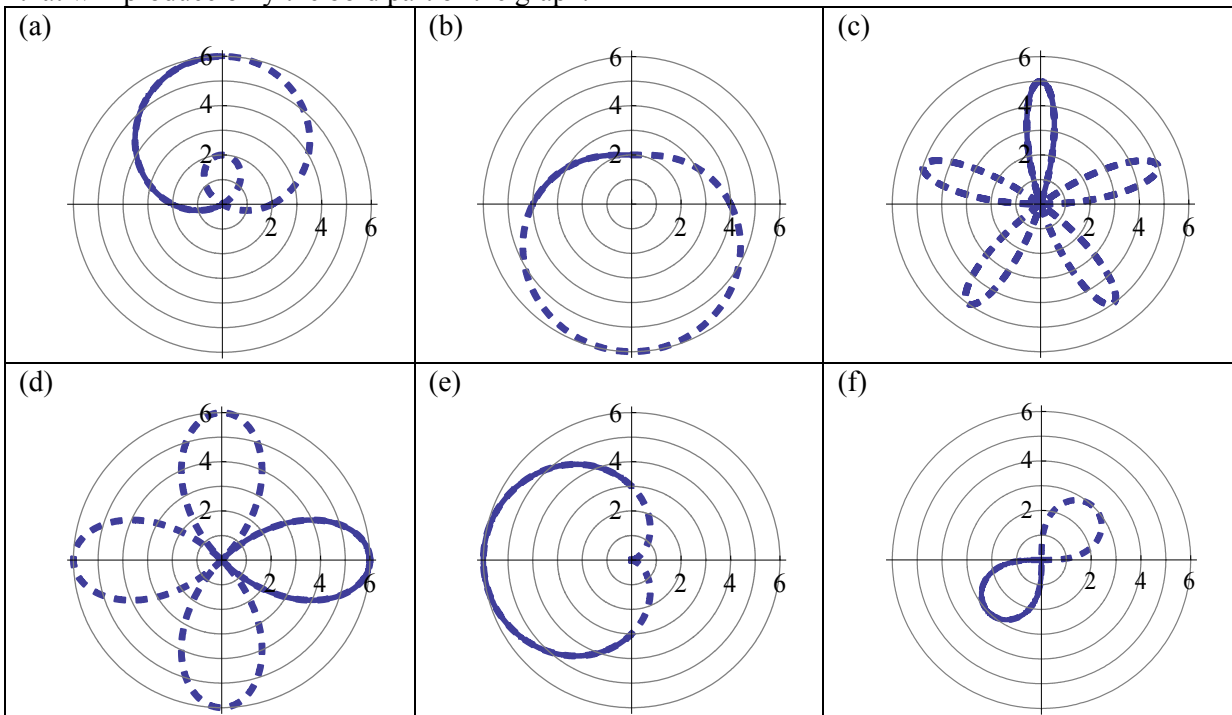
6. Graph the following conics, and find the focus(foci), directrix(directrices), and the corresponding rectangular equation.

(a)  $r = \frac{3}{1 + 2 \cos \theta}$

(b)  $r = \frac{2}{\sin \theta - 3}$

(c)  $r = \frac{4}{1 + \sin \theta}$

7. For each of the following graphs, name it, find the corresponding polar equation, and find an interval that will produce only the bold part of the graph.



8. Find all the points where the graphs of  $r = 2 + 2 \cos \theta$  and  $r = 6 \cos \theta$  intersect. Express your answers in both Polar and Rectangular forms.
9. The Convex Limaçon  $r = 4 - \cos \theta$  and the Circle  $r = 5 \cos \theta$  intersect at two points. Find the rectangular coordinates of these two points.