

Parametrics and Polar Test

Parametric Equations

1. Eliminate the parameter and find a rectangular equation for the following parametric equations. Show all work.
 1. [3pts] $x = t^3$ and $y = 1 - t$
 2. [3pts] $y = 4 \sin t$ and $y = 3 \cos t$
2. Graph the curve whose parametric equations are given, indicating the orientation of the curve with arrows.
 1. [4pts] $x = t + 5$ and $y = (t - 1)^2$ where $-2 \leq t \leq 2$
 2. [4pts] $x(t) = 4 \cos t$ and $y(t) = 4 \sin t$

Polar Coordinates

1. Which of the following is not a possible coordinate for the indicated point.
2. Convert $(5, -5)$ to polar coordinates with $0 \leq \theta < 2\pi$
3. Convert $(6, 2\pi/3)$ to rectangular coordinates
4. Which of the following points is furthest from the origin?
5. Which points are between $\theta = \frac{\pi}{4}$ and $\theta = 3\pi/4$?
6. Convert to polar: $x^2 - y^2 = 16$
7. Convert to rectangular: $r = 4 + 4 \cos(\theta)$
8. Which of the following is the graph of $r = 3 - 4 \cos(\theta)$?
9. Which of the following is the graph of $r = -4 \cos(\theta)$?
10. What are the x -intercepts of $r = \sin(\theta) - \cos(\theta)$
11. What conic section is represented by $r = \frac{1}{2 - 3 \cos(\theta)}$?

True/False

1. It is possible for a single point in the plane to have the same coordinates in both rectangular and polar representations.
2. A function $y = f(x)$ cannot intersect itself
3. The graph of a parametric system cannot intersect itself.
4. Every polar graph fails the vertical line test.
5. Every point in the plane has infinitely many polar coordinate representations.

Free Response

A baseball pitcher throws a baseball with an initial speed of 138 feet per second at an angle of 20° to the horizontal. The ball leaves the pitcher's hand at a height of 4 feet above the ground.

1. [1pt] Find parametric equations that describe the motion of the ball as a function of time. (Assume the ground has a y-coordinate of 0).
2. [1pt] How long is the ball in the air?
3. [1pt] At what time does the ball reach its maximum height?
4. [1pt] What is the maximum height of the ball?
5. [1pt] Determine the distance the ball travels.