Math 111
Chapter 10.3: Polar Coordinates

Polar Coordinates are another means by which we can describe points in a plane. Instead of giving a pair of numbers (x, y), we will give a pair of numbers (r, θ), where r is the distance from the origin, and θ is the angle between the line that connects the point with the origin and the positive x axis.

(EXAMPLES)

We can connect x and y to r and θ using trigonometry.

Polar Curves are the collection of points that satisfy an equation involving r and θ. A common situation is $r = f(\theta)$, but we can also consider more general equations.

(EXAMPLES)

1. $r = 3$

2. $\theta = \pi/3$

3. $r = 2\sin\theta$

4. $r = 1 + \sin\theta$

5. $r = \sin 3\theta$

(TANGENT LINES)

To find the slope of a line tangent to a polar curve, we will need $\dfrac{dy}{dx}$ as before.

(EXAMPLES)

1. Find the equation of the line tangent to $r = \sin 3\theta$ at the point where $\theta = \pi/6$.

2. $r = 1 + \sin\theta$ at the point where $\theta = \pi/3$.

3. $r = \theta$ at the point where $\theta = \pi$, $\theta = 3\pi$, and $\theta = 5\pi$.

4. $r = \cos 2\theta$ at the point where $\theta = \pi/4$.