Review of curves defined using polar coordinates

Associated to any pair of numbers (r, θ) is a point in the plane determined as follows:

With polar coordinates, we allow negative r, which sometimes produces unexpected results (as we shall see).

Basic graphs:

Example 1. $r = 3$

Example 2. $\theta = \pi/4$

Let's do two more examples that are a little more complicated.

Example 3. $r = 3\cos\theta$

Example 4. $r = \cos 2\theta$

In this course, polar coordinates are used to describe curves, regions, and functions that have a lot of radial symmetry, and we need to be able to convert from rectangular coordinates to polar coordinates and vice versa. The conversion formulas all come from trigonometry.

Example 3 revisited. How can we convert $r = 3\cos\theta$ to rectangular coordinates?

Example 5. $r = 1 + 2\cos\theta$