Calculus 2502A - Advanced Calculus I
Fall 2014
§10.3: Polar coordinates

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Example 1. Find the polar coordinates of the point whose Cartesian coordinates are $(x, y) = (-2, 5)$.

Solution. We have:

$$r = \sqrt{x^2 + y^2} = \sqrt{4 + 25} = \boxed{\sqrt{29}}.$$

Since the point is in the second quadrant (with $x < 0$ and $y > 0$), its angle θ is given by any of the following formulas:

$$\theta = \arccos\left(\frac{x}{r}\right) = \boxed{\arccos\left(\frac{-2}{\sqrt{29}}\right)} \approx 1.9513$$

$$\theta = \pi - \arcsin\left(\frac{y}{r}\right) = \boxed{\pi - \arcsin\left(\frac{5}{\sqrt{29}}\right)} \approx 1.9513$$

$$\theta = \arctan\left(\frac{y}{x}\right) + \pi = \boxed{\arctan\left(\frac{5}{-2}\right) + \pi} \approx 1.9513$$
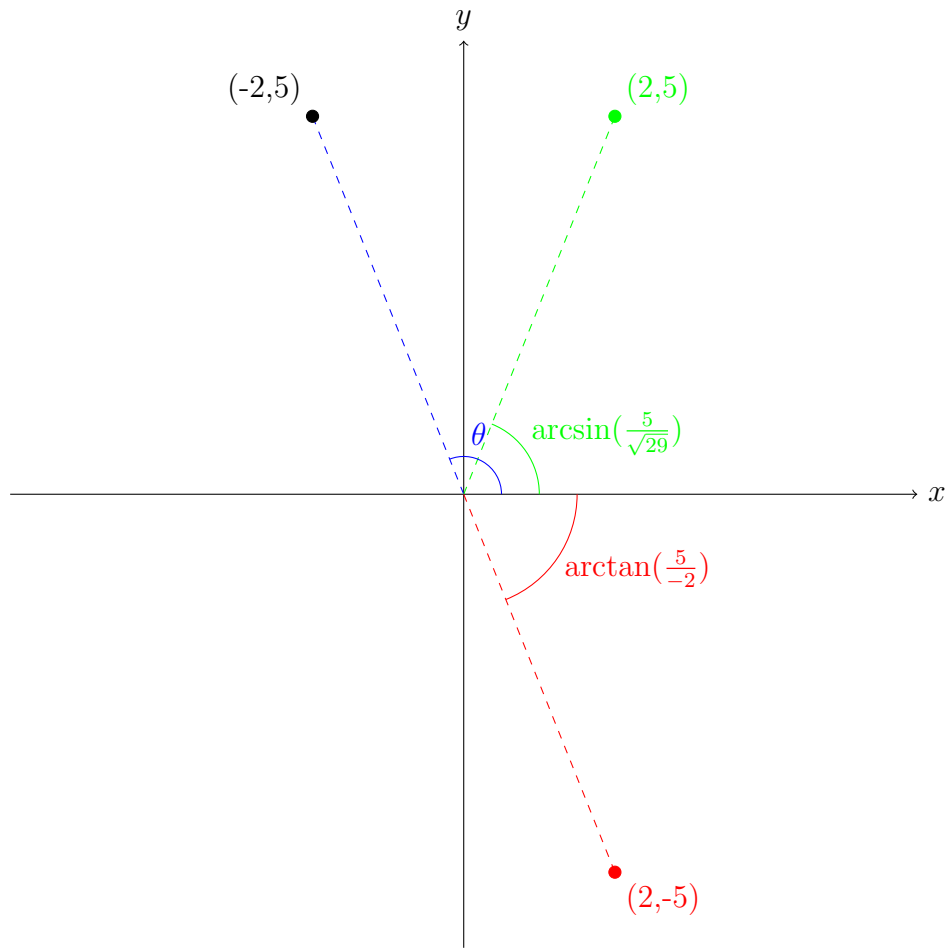
as illustrated in Figure 1.

Figure 1: Angle in polar coordinates.