EXAMPLE 5 **Converting from Polar Form to Rectangular Form**

Convert $r = 4 \sec \theta$ to rectangular form and identify the graph. Support your answer with a polar graphing utility.

$$\frac{r}{\sec\theta} = 4$$

$$r\cos\theta = 4$$

$$x = 4$$

EXAMPLE 6 Converting from Rectangular Form to Polar Form

Convert $(x-3)^2 + (y-2)^2 = 13$ to polar form.

$$x^2 - 6x + 9 + y^2 - 4y + 4 = 13$$

$$x^2 + y^2 - 6x - 4y + 13 = 13$$

$$r^2 - 6r\cos\theta - 4r\sin\theta = 0$$

$$r(r - 6\cos\theta - 4\sin\theta) = 0$$
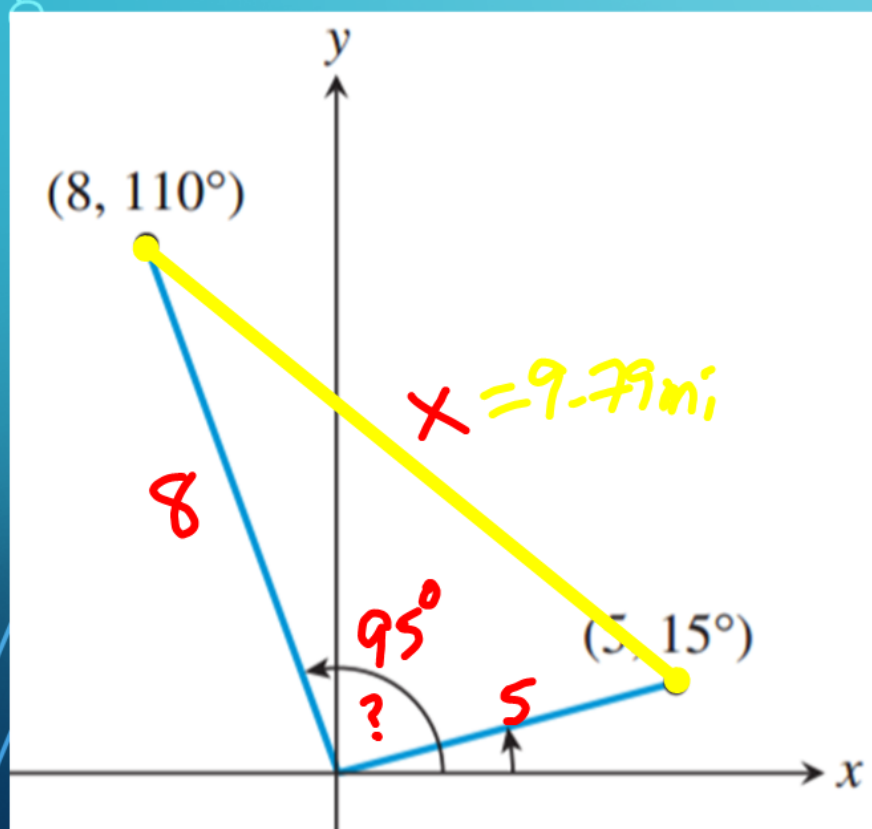
$$r = 0 \qquad r - 6\cos\theta - 4\sin\theta = 0$$

$$r = ?$$

$$r = 0$$

$$r = 6\cos\theta + 4\sin\theta$$

EXAMPLE 7   Using a Radar Tracking System

Radar detects two airplanes at the same altitude. Their polar coordinates are (8 mi, 110°) and (5 mi, 15°). (See Figure 6.44.) How far apart are the airplanes?

$$x^2 = 8^2 + 5^2 - 2(8)5\cos 95°$$

$$x^2 = 95.97......$$

$$x = \sqrt{ans}$$

$$x = 9.79 \text{ mi}$$

(8, 110°)

x = 9.79 mi

8

95°

?

5

(5, 15°)

EXAMPLE 6 **Converting from Rectangular Form to Polar Form**

Convert $(x - 3)^2 + (y - 2)^2 = 13$ to polar form.