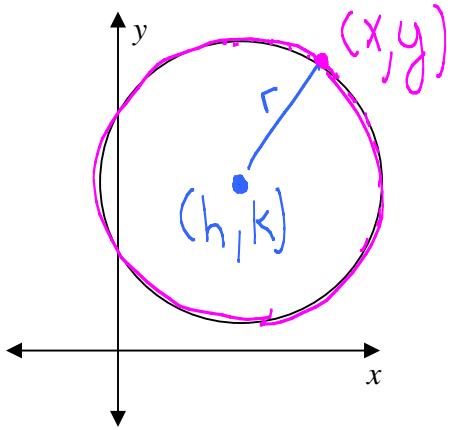


PreCalculus Notes: Circles CS-2

Equation of a Circle

1. From the locus definition:

Definition: A circle is the locus of points that are all



distance formula

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$r = \sqrt{(x - h)^2 + (y - k)^2}$$

$$r^2 = (x - h)^2 + (y - k)^2$$

2. By transforming the unit circle

Py Thm

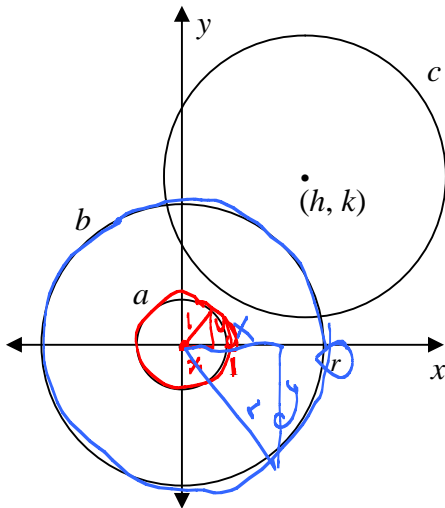
$$x^2 + y^2 = 1$$

radius, r  
dilation

$$x^2 + y^2 = r^2$$

translation  $(x - h)^2 + (y - k)^2 = r^2$

$$(0, 0) \rightarrow (h, k)$$



ex) a)  $(x + 7)^2 + (y - 2)^2 = 16$

center:  $(-7, 2)$

radius:  $r = 4$

b)  $(x - 1)^2 + y^2 = 5$

center:  $(1, 0)$

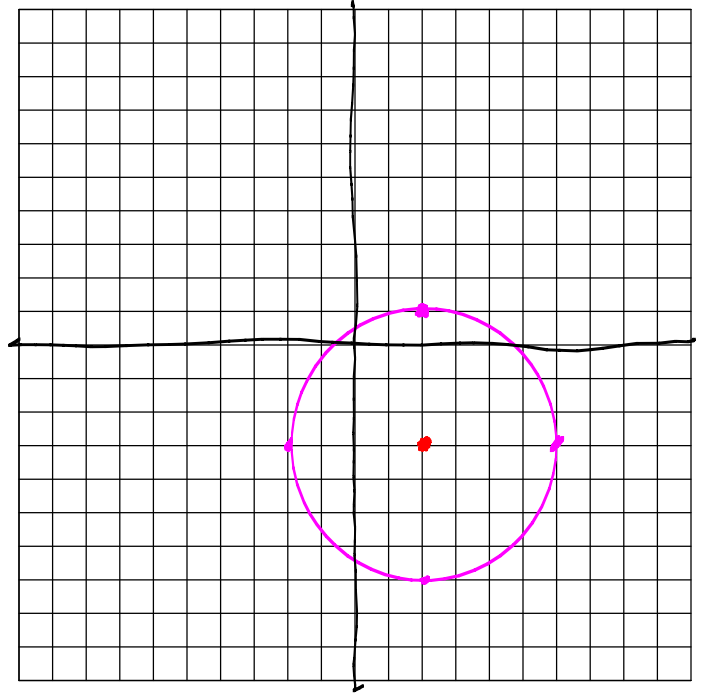
radius:  $r = \sqrt{5}$

### 3. Examples

a. Write the equation of the circle with center at (2, -3) and radius = 4. Sketch it.

$$(x - 2)^2 + (y - (-3))^2 = (4)^2$$

$$(x - 2)^2 + (y + 3)^2 = 16$$



b. Find the length of the radius and the coordinates of the center of the circle and sketch it.

$$x^2 + y^2 - 12x + 3y + 26 = 0$$

$$x^2 - 12x + y^2 + 3y + 26 = 0$$

$$(x - 6)^2 - 36 + (y + \frac{3}{2})^2 - \frac{9}{4} + 26 = 0$$

$$(x - 6)^2 + (y + \frac{3}{2})^2 = \frac{49}{4}$$

$$(6, -\frac{3}{2}) \quad r = \frac{7}{2}$$

