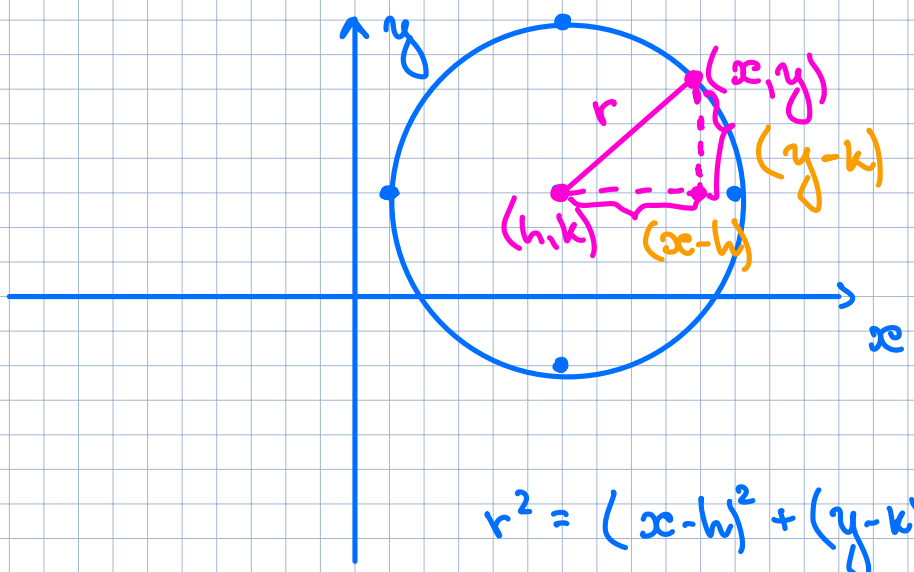
Section 2.2. Circles

1. The standard form of the equation of a circle.
2. Graphing circles.

1.



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

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

Def. (Standard form of a circle)

The <u>standard form</u> of the equation for a circle of radius (r) and center (h,k) is

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

Example

$r = 3$

center $(-2, 7)$

$h = -2$, $k = 7$, $r = 3$

$$(x+2)^2 + (y-7)^2 = 3^2$$

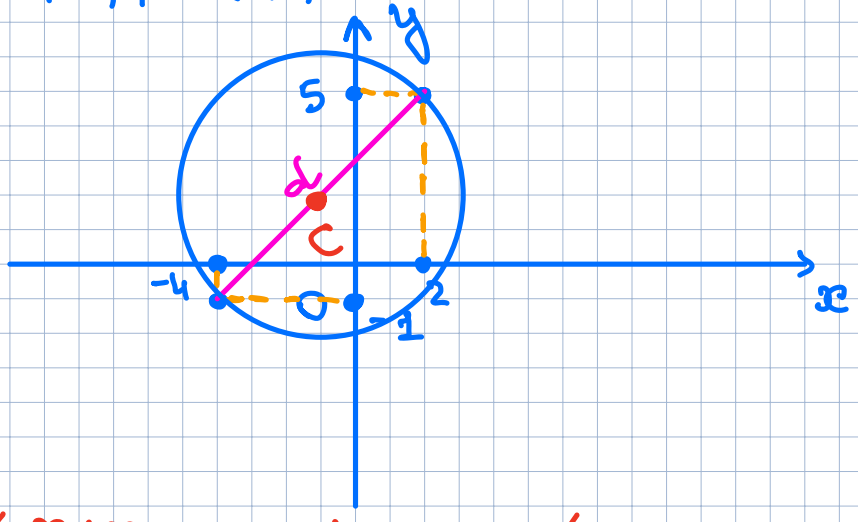
$$\Downarrow$$

$$\boxed{(x+2)^2 + (y-7)^2 = 9}$$

Example

diameter = AB

$A(-4, -1)$, $B(2, 5)$.



$$C\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \Rightarrow C(-1, 2)$$

center is $(-1, 2)$

$$r = \sqrt{(2+1)^2 + (5-2)^2} = \sqrt{3^2 + 3^2} =$$

$$= \sqrt{18} = 3\sqrt{2}$$

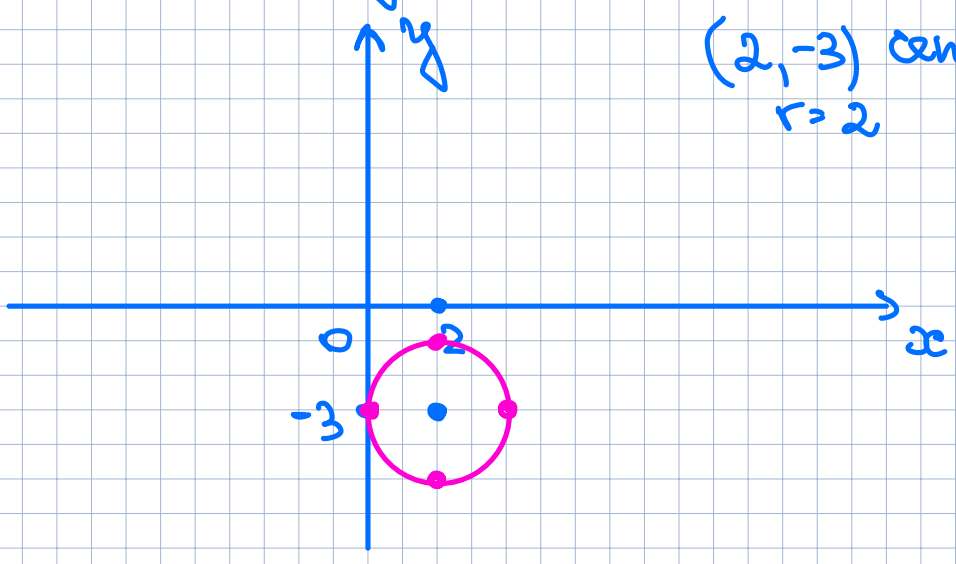
Circle equation: $\boxed{(x+1)^2 + (y-2)^2 = 18}$

2. Example 1

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

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

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



$(2, -3)$ center

$r = 2$

Example

$$x^2 + y^2 + 8x - 2y = -1$$

First, we need to complete the square.

$$x^2+8x+y^2-2y+1=0$$

$$(x^2+8x)+(y^2-2y+1)=0$$

$$(x+4)^2-16+(y-1)^2=0$$

$$(x+4)^2+(y-1)^2=4^2$$

$$(x-(-4))^2+(y-1)^2=4^2$$