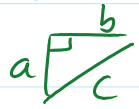
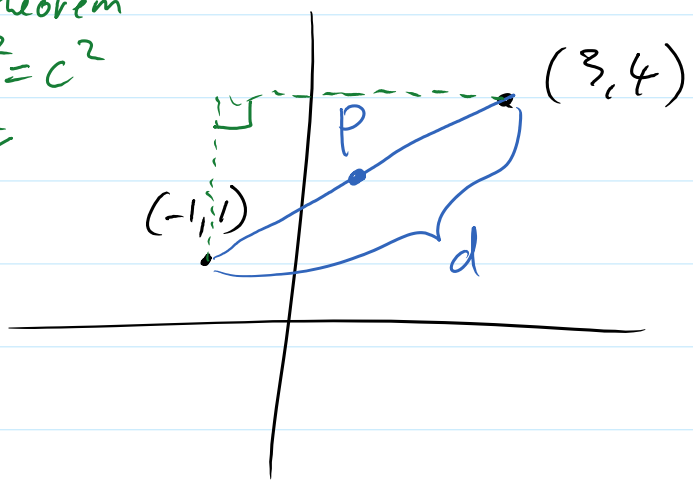
Offline HW 1 due on 9/26 in class
Test 1 on 10/3

Section 2.8

Pyt. theorem
$a^2+b^2=c^2$





$P=\left(\frac{-1+3}{2}, \frac{1+4}{2}\right)$

$P=\left(\frac{2}{2}, \frac{5}{2}\right)=\left(1, \frac{5}{2}\right)$

$d=\sqrt{(3-(-1))^2+(4-1)^2}$

$=\sqrt{4^2+3^2}$

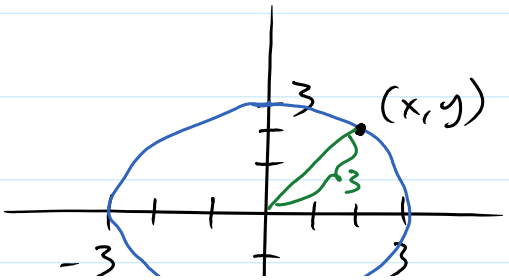
$=\sqrt{16+9}=\sqrt{25}=\boxed{5}$

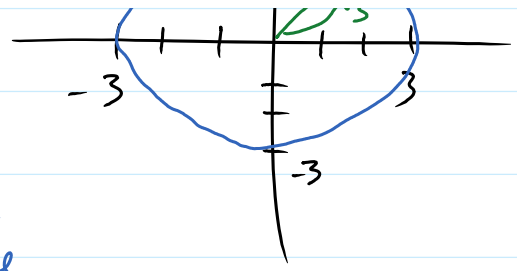
Midpoint formula: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

distance formula: $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

Find all the point (x,y) that are 3 units away from $(0,0)$

Using the distance formula:





$$3 = \sqrt{(x-0)^2 + (y-0)^2}$$

$$3 = \sqrt{x^2+y^2}$$

$$3^2 = x^2+y^2$$

equation of the circle with radius 3 and center at (0,0)

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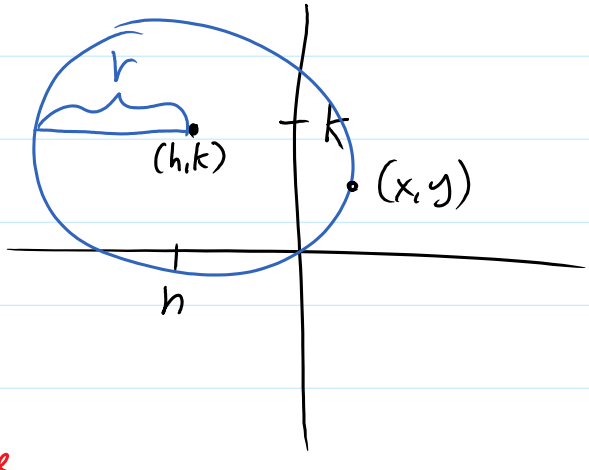
let's find the equation of the circle with radius r and center at (h, k)



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

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

Standard equation of a circle with the center at (h, k) and radius r.

Ex. Write down the standard equation of the circle with center (-2, 3) and radius 4.

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

$$\boxed{(x+2)^2 + (y-3)^2 = 16}$$

$(a+b)^2 = a^2+2ab+b^2$

$$x^2+4x+4+y^2-2\cdot 3y+9 = 16$$

$$x^2+4x+4+y^2-2\cdot 3y+9=16$$
$$x^2+y^2+4x-6y-3=0$$

The general form of the equation of a circle is

$$x^2+y^2+Dx+Ey+F=0,$$

where D, E, F are constants.

Ex: Find the center, radius and the stand. form of:

$$x^2+y^2+4x-6y-23=0$$

need to complete the square

$$x^2+\underbrace{4}x+2^2+y^2\underbrace{-6}y+(-3)^2-23=0+2^2+(-3)^2$$

$\frac{4}{2}=2$ $\quad$ $\frac{-6}{2}=-3$

$$(x+2)^2+(y-3)^2-23=2^2+(-3)^2$$
$$(x+2)^2+(y-3)^2=23+4+9$$
$$\boxed{(x+2)^2+(y-3)^2=36}$$

center: $(-2,3)$, radius: $\sqrt{36}=6$

Convert to standard form, find center & radius

Convert to standard form, then complete the square

$$x^2+y^2+6x+2y+6=0$$

Group x's and y's

$$x^2+6x+3^2+y^2+2y+1^2=-6+3^2+1^2$$

$\frac{6}{2}=3$ $\frac{2}{2}=1$

Complete the square

$$(x+3)^2+(y+1)^2=-6+9+1=4$$

$$(x+3)^2+(y+1)^2=4$$

Center: $(-3,-1)$, radius 2

Identify which equation describes a circle.

a) $x^2+6x-y^2+5y-7=0$

Not a circle

b) $x^2+y^2-4x-12y+90=0$

$$x^2-4x+(-2)^2+y^2-12y+(-6)^2=-90+(-2)^2+(-6)^2$$

$\frac{-4}{2}=-2$ $\frac{-12}{2}=-6$

$$(x-2)^2+(y-6)^2=-50$$ Not a circle.

c) $x^2+3x+y^2-2y-1=0$

$$x^2+3x+\left(\frac{3}{2}\right)^2+y^2-2y+(-1)^2=1+\left(\frac{3}{2}\right)^2+(-1)^2$$

$$x^2+3x+\left(\frac{3}{2}\right)^2+y^2-2y+(-1)^2=1+\left(\frac{3}{2}\right)^2+(-1)^2$$

$\frac{3}{2}$ $\qquad$ $\frac{-2}{2}=-1$

$$\left(x+\frac{3}{2}\right)^2+(y-1)^2=1+\frac{9}{4}+1=2+\frac{9}{4}=2\cdot\frac{4}{4}+\frac{9}{4}=\frac{8+9}{4}$$

$$\boxed{\left(x+\frac{3}{2}\right)^2+(y-1)^2=\frac{17}{4}}$$

$$\boxed{(x+1.5)^2+(y-1)^2=4.25}$$

Center: $\boxed{(-1.5, 1)}$

radius: $\sqrt{4.25}=\sqrt{\frac{17}{4}}=\frac{\sqrt{17}}{\sqrt{4}}=\boxed{\frac{\sqrt{17}}{2}}$