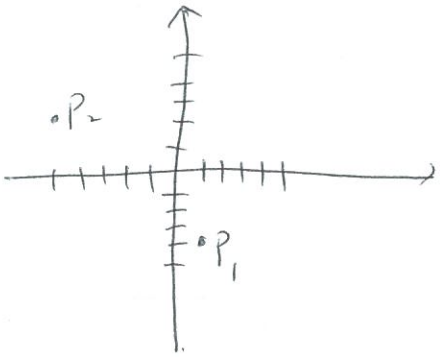
Name: Worksheet 1, Math 1113

1. Mark the points $P_1(1,-4)$ and $P_2(-5,2)$ on a coordinate plane. Determine the distance between the two points.



$$d(P_1,P_2) = \sqrt{(-5-1)^2 + (2-(-4))^2}$$
$$= \sqrt{36+36}$$
$$= \sqrt{72}$$

2. Graph the following equation by plotting the points. Determine the x- and y-intercepts and then mark the points on your graph.

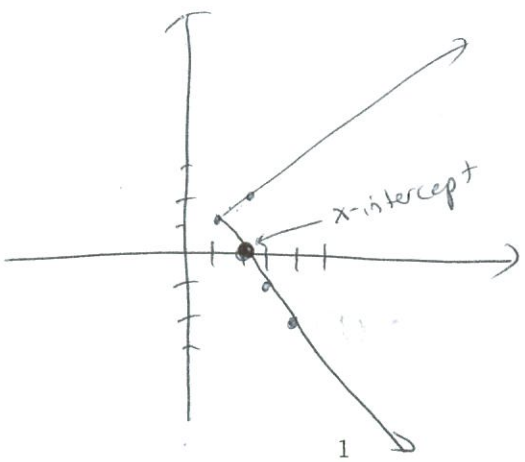
$$x = |y-1|+1$$

($|x|$ means the absolute value of x)

X	y
4	-2
3	-1
2	0
1	1
2	2

let $y=-2 \Rightarrow x = |-2-1|+1 = 3+1 = 4$
$y=-1 \Rightarrow x = |-1-1|+1 = 2+1 = 3$
$y=0 \Rightarrow x = |0-1|+1 = 1+1 = 2$
$y=1 \Rightarrow x = |1-1|+1 = 1$
$y=2 \Rightarrow x = |2-1|+1 = 2.$

Note: you could have picked different pts here instead of $y=-2,-1,0,1,2$



x-intercept: let $y=0$
$\Rightarrow x = |0-1|+1 = 1+1 = 2$
$(2,0)$ is the x-intercept

y-intercept: let $x=0$
$\Rightarrow 0 = |y-1|+1$
$\Rightarrow -1 = |y-1|$
no solution since $|y-1|$ cannot be negative.
So no y-intercept.

3. Mark the point $P(1,2)$ on a x-y plane. Determine the points on the x-axis that are distance 3 away from P and mark them on the coordinate plane.

A pt $Q(x,y)$ is on the x-axis if $y=0 \Rightarrow Q(x,0)$

And Q is distance 3 away from P if

$$d(P,Q)=3$$

$$\sqrt{(x-1)^2+(y-2)^2}=3$$

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

but we know $y=0$ so

$$(x-1)^2+(0-2)^2=9$$

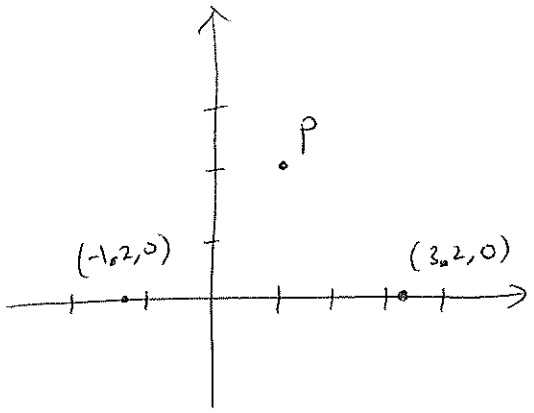
$$(x-1)^2+4=9$$

$$(x-1)^2=5$$

$$x-1=\pm\sqrt{5}$$

$$x=\pm\sqrt{5}+1$$

$$\simeq 3.2, -1.2$$



4. Write an equation of a circle centered at $(1,0)$ with a radius 3.

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

5. (a) Find a such that

$$x^2 + 6x = (x + a)^2 - c$$

for some c.

$x^2 + 6x = x^2 + 2ax + a^2 - c$

$\Rightarrow 6x = 2ax$

$6 = 2a$

$3 = a$

$9 = a^2$

$\Rightarrow x^2 + 6x = (x+3)^2 - 9$

(b) Find b such that

$$y^2 - 2y = (y + b)^2 - d$$

for some d.

$y^2 - 2y = y^2 + 2by + b^2 - d$

$\Rightarrow -2y = 2by$

$\Rightarrow b = -1$

$b^2 = 1$

$\Rightarrow y^2 - 2y = y^2 - 2y + 1 - 1 = (y-1)^2 - 1$

(c) Put the following equation of a circle in the standard form

$$x^2 + 6x + y^2 - 2y + 7 = 0$$

$(x+3)^2 + 9 + (y-1)^2 - 1 + 7 = 0$

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