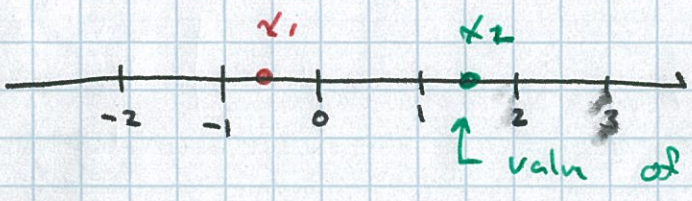
Math 1113 – Day 1 – June 5, 2017

Hand out syllabus – go over important parts.

Sect 1.1

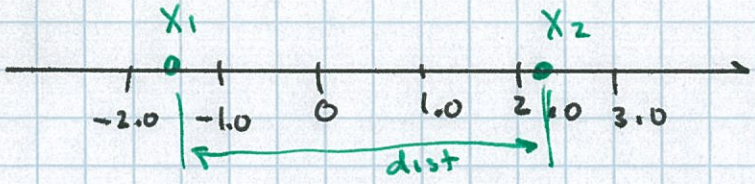
- coordinate systems
- distance formula
- graphs of relationships.
- intercepts.

Recall – 1 dimension



$x_2 < x_1$ distance $= |x_2 - x_1|$

ex/



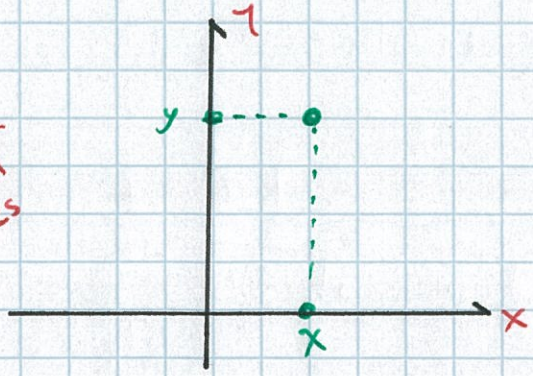
$x_1 = -1.5$

$x_2 = 2.1$

$dist = |2.1 - (-1.5)| = |3.6| = 3.6$

↑ always pos.

2 Dimensions



always label axes

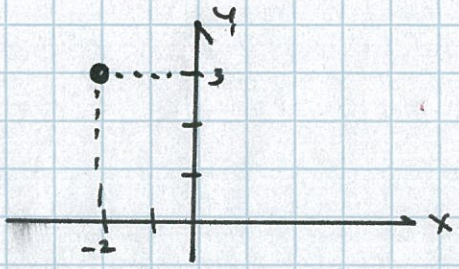
we can describe any point as a pair of numbers, (x, y).

x: horizontal axis

y: vertical axis.

"x" and "y" are not sacred symbols. Any thing can be used

ex/ plot the point $(-2, 3)$.



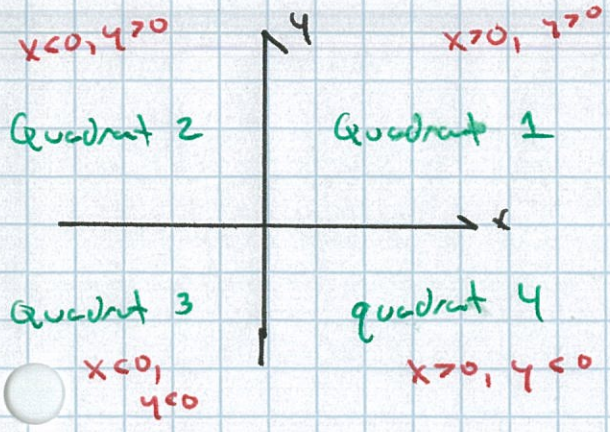
(plot the pt. $(4, -1)$)

Notation

$P_1 = P_1(-2, 3)$ is the pt. @ $(-2, 3)$

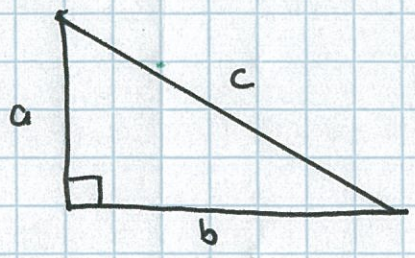
$P_2 = P_2(4, -1)$ is the pt. @ $(4, -1)$

Nomenclature



Later we will discuss the "unit circle" and this is consistent w/ how things are defined in that context.

Pythagorean Thm



if abc is a right triangle

then

$$c^2 = a^2 + b^2$$

"hypotenuse"

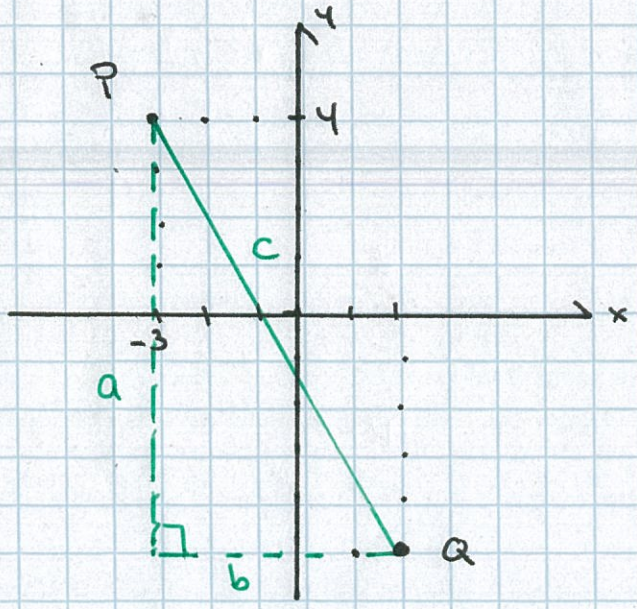
or $c = \sqrt{a^2 + b^2}$

so what?

Q: given two points, $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$, what is the dist. between them?

- we play a game called "find the hidden triangle."

ex/ Determine the distance between $P(-3,4)$ and $Q(2,-5)$.



$a = |x_2 - x_1| = |-5 - 4| = 9$

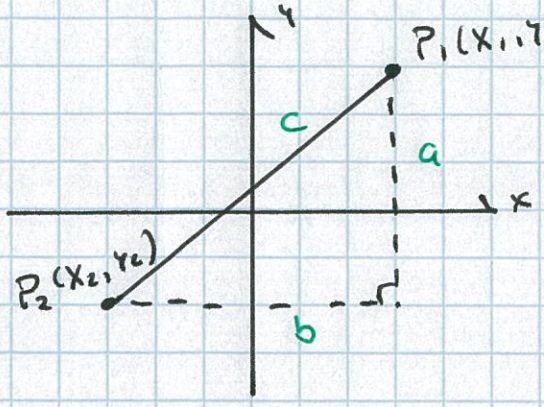
$b = |y_2 - y_1| = |2 - (-3)| = 5$

$c^2 = 9^2 + 5^2 = 81 + 25$

$= 106$

$c = \sqrt{106}$

In general



$a = |x_2 - x_1|$

$b = |y_2 - y_1|$

$c^2 = |x_2 - x_1|^2 + |y_2 - y_1|^2$

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

why drop the abs. value?

Notation: $c = d(P_1, P_2)$

see ex 2 on p 122.

Plotting points

suppose you have a "relationship"

ex/ $y^2 + x = 1$

what set of values, (x,y), satisfy the relationship? (They come in pairs!)

- solve for the "easier" variable to get...

$x = 1 - y^2$ (solve for x)

Try diff vals of one variable & det. the other var.

let $y = -2 \Rightarrow x = -3$

$y = -1 \quad x = 0$

$y = 0 \quad x = 1$

$y = 1 \quad x = 0$

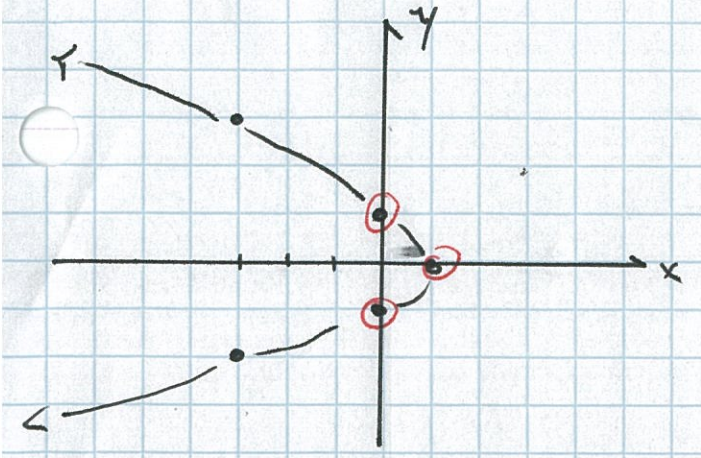
$y = 2 \quad x = -3$

$\vdots$

as a table $\Rightarrow$

x	y
-3	-2
0	-1
1	0
0	1
-3	2

now plot each pt.



Note- axes labelled!
Assume cont. (problem!)

Note: there are a few "interesting" points.

x-intercepts - where the graph passes through the x-axis. (i.e. when $y=0$)

y-intercepts - where the graph passes through the y-axis. (i.e. when $x=0$)

we had $x = 1 - y^2$

x-intrcpt: let $y=0 \Rightarrow x=1$

so $(1,0)$

y-intrcpt: let $x=0 \Rightarrow 0 = 1 - y^2$

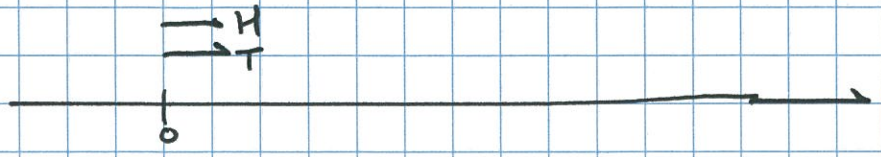
$y^2 = 1$

so $y=1$ or $y=-1$

so $(0,1)$ and $(0,-1)$

optional - if time permits

A tortoise and a hare move in a straight line.



at any time, t, the tortoise's pos. is $(\frac{1}{2}t)$ m. (t in min)

at any time, t, the hare's pos. is $(8t)$ m.

plot their positions as coordinates in the form P(tortoise pos, hare pos.)

time	tortoise pos.	hare pos.
0	0	0
1	1/2	8
2	1	16
3	3/2	24
4	2	32

$P_1(0,0)$
$P_2(1/2, 8)$
$P_3(1, 16)$
$P_4(3/2, 24)$
$P_5(2, 32)$