- real plane : all pairs of real #'s (x, y)

- point : one pair of real #'s / ex) $(3, 4)$ = point

drawing of plane :

(3,1)

(x,y) = (0,0)
"the origin"

(-1,-2)
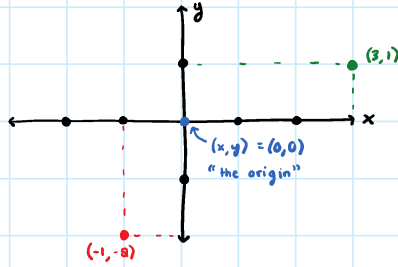
types of questions:

1) give equation : draw solutions

2) compute quantities : distances, magnitudes, intersections

ex 1) check if points are in $\{2x - y = 1\}$

- $(0,0)$ ✗ $2(0) - 0 = 1 \rightarrow 0 = 1$ (doesn't belong)

- $(0, -1)$ ✓ $2(0) - (-1) = 1 \rightarrow 1 = 1$ (belongs)

- $(2, 3)$ ✓ $2(2) - 3 = 1 \rightarrow 1 = 1$ (belongs)

def : a <u>line</u> is any set in plane given by equation of form:
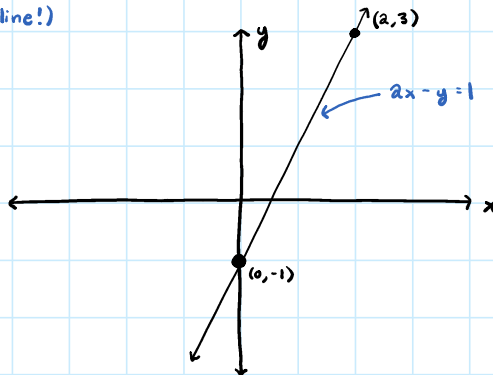
infinite

$$ax + by = d$$

previous ex) $a = 2$ $b = -1$ $d = 1$

* anything but plain x & y ≠ line / parabola, hyperbola, circle etc. ≠ line *

ex 1 cont) draw $\{2x - y = 1\}$ (a line!)

- plug in values for $x \rightarrow$ get y

- line / circle = need 2 points

- plane = need 3 points

(2,3)

$2x - y = 1$

(0,-1)

* if $d = 0$, then line goes thru origin / not in this ex *

how to draw solutions of equations?

1) sample points (check if equation holds for values given)
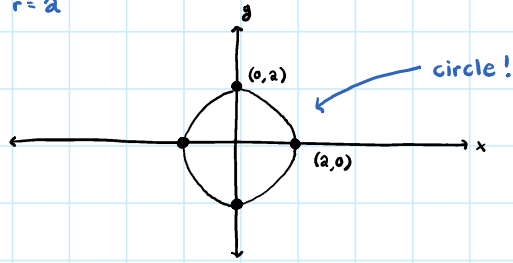
2) use knowledge on equations (lines, circles)

ex 2) draw $\left\{ x^2 + y^2 = 4 \right\}$ → $r = 2$

(not line → circle)

(0,0) ✗

(2,0) ✓

(0,2) ✓

(1,1) ✗

circle!

(0,2)

(2,0)

y

x

#'s in front of x & y could be
circle   or   not /depends

def : a circle of radius r centered @ (0,0) is given by equation :

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

previous ex) r = 2

r