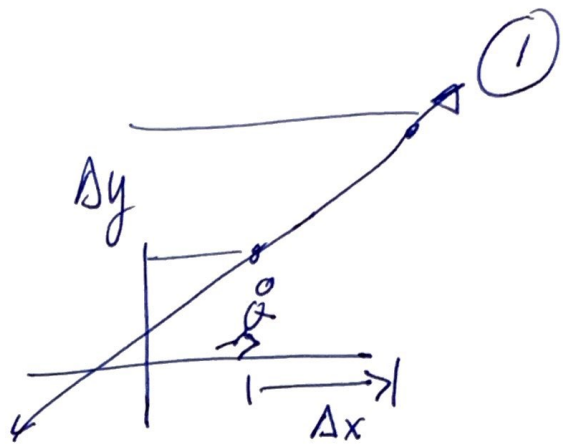


Chpt 2 Summary

* Lines

• slope $m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$



Ex What is the slope of the line passing through
① $(1, -4)$ & $(-5, 7)$ ②

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - (-4)}{-5 - 1} = \frac{11}{-6} = \boxed{-\frac{11}{6}}$$

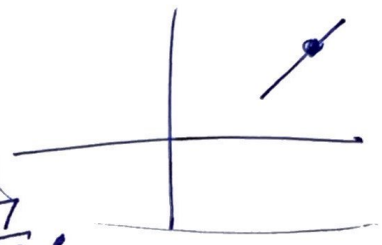
• eqn. of line passing through a y-intercept possessing a slope m .

Ex Find the equation of a line of slope $-\frac{4}{3}$ and having a y-int @ -2

Form: $y = mx + b$

Plugin: $y = -\frac{4}{3}x - 2$

• eqn. of line with slope m and passing through a random point



Ex Find the eqn. of a line thru the point (2, -4) with a slope of $\frac{7}{6}$.

1. Form: $y = \frac{7}{6}x + b$
 2. Point: $-4 = \frac{7}{6}(2) + b$
 3. Solve: $-4 = \frac{7}{3} + b$
 4. Final: $y = \frac{7}{6}x - \frac{19}{3}$
- $\rightarrow -4 - \frac{7}{3} = b$
 $\underline{\underline{b = -\frac{19}{3}}}$
- ↘ FPSF

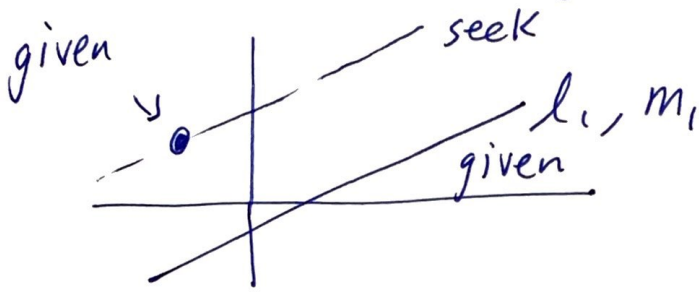
• eqn of a line passing thru two points

Ex Find eqn of line thru (-1, 4) & (5, -7)

0. slope $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - 4}{5 - (-1)} = \frac{-11}{6}$

1. Form: $y = -\frac{11}{6}x + b$
 2. Point: $-7 = -\frac{11}{6}(5) + b$
 3. Solve: $-7 + \frac{55}{6} = b$
 4. Final: $y = -\frac{11}{6}x + \frac{13}{6}$
- $\rightarrow b = \frac{-42}{6} + \frac{55}{6} = \frac{13}{6}$

- Equation of a line "||" to a given line, but passing through a given point. (3)



for ||-lines

$$m_1 = m_2$$

[EX] Find the equation of a line || to $y = 3x + 100000$ passing through $(-4, 7)$

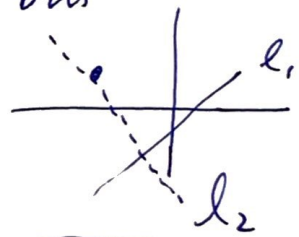
Form: $y = 3x + b$

Point: $7 = 3(-4) + b$

Solve: $b = 19$

Final: $y = 3x + 19$

- Egn of line \perp to a given line, but passing through a point (given)



$$m_1 = -\frac{1}{m_2}$$

[EX] Find the eqn of a line \perp to $y = 3x + 10000$ but passing through $(-5, 2)$

m so $m_{\perp} = -\frac{1}{3}$

Form: $y = -\frac{1}{3}x + b$

Point: $2 = -\frac{1}{3}(-5) + b$

Solve: $\frac{6}{3} - \frac{5}{3} = b$

Final: $y = -\frac{1}{3}x + \frac{1}{3}$

* Equation of lines in Standard Form

(4)

• $y = mx + b$ slope-intercept

$(y - y_1) = m(x - x_1)$ point-slope

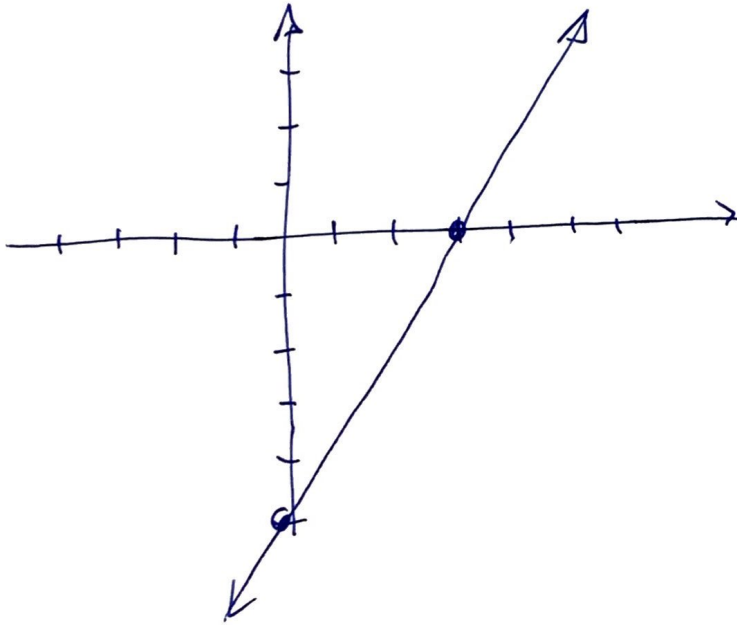
• $Ax + By = C$ std. form

$Ax + By + D = 0$ General form

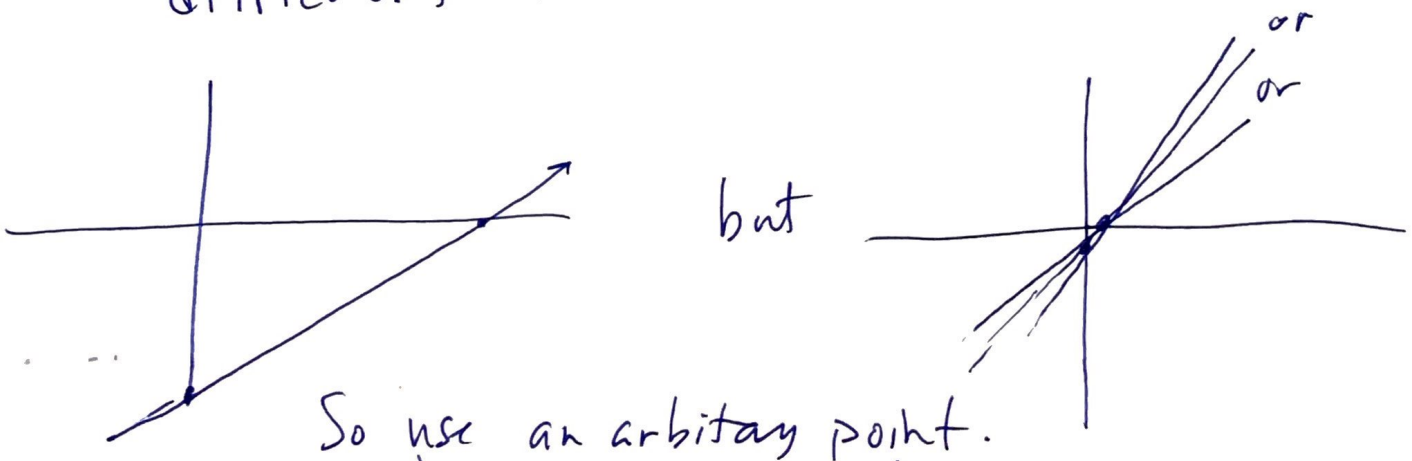
* Graphing : $5x - 3y = 15$ "cover-up method"

$x = 0 ; -3y = 15, y = -5$
 $(0, -5)$

$y = 0 ; 5x = 15, x = 3$
 $(3, 0)$



When these intercepts are close to each other it becomes difficult to draw an accurate line



EX

$$\frac{1}{2}x - \frac{1}{3}y = 5$$

$$(0, -15)$$

$$(10, 0)$$

} Far away from each other (5)

$$(4, 9)$$

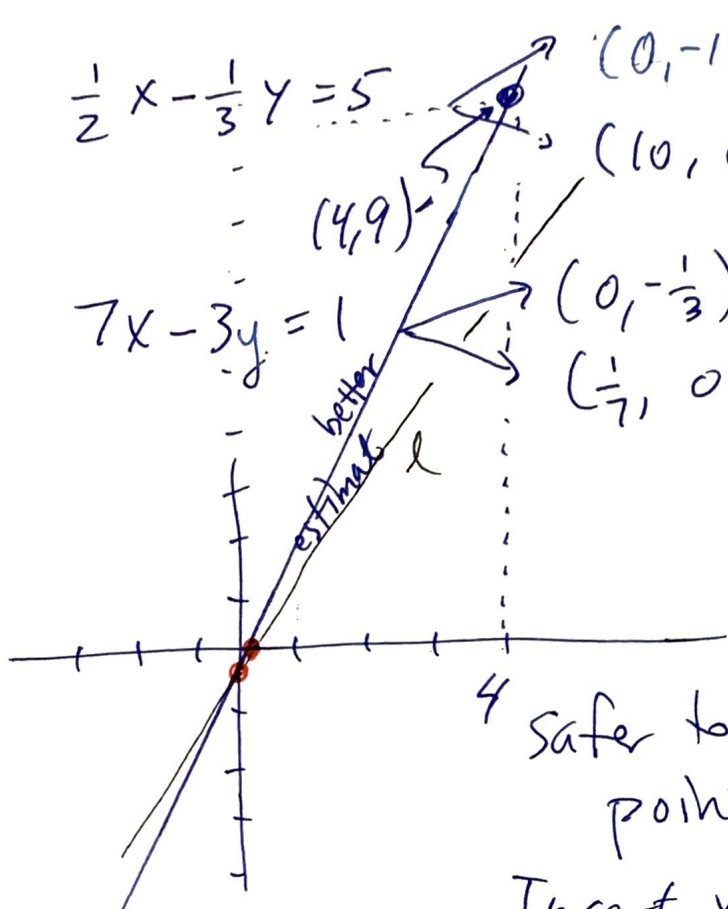
EX

$$7x - 3y = 1$$

$$(0, -\frac{1}{3})$$

$$(\frac{1}{7}, 0)$$

} close together



4 safer to pick a far away point: let $x = 4$

Insert $x = 4$ and solve for y :

$$7(4) - 3(y) = 1$$

$$-3y = 1 - 28$$

$$y = 9 \rightarrow (4, 9)$$

• ||-lines with std. form

$Ax + By = C$ is parallel to $Ax + By = D$

that is not necessary, it is sufficient.

$Ax + By = C$ is ||-to $Ex + Fy = G$ if

$$A/B = E/F$$

EX

$$2x - 3y = 10 \text{ is } \parallel \text{ to } 2x - 3y = 11$$

6

but $14x - 21y = 44$ is also \parallel to $2x - 3y = 10$

$$\rightarrow \frac{2}{-3} \stackrel{?}{=} \frac{14}{-21} \checkmark$$

EX

Find the equation of a line \parallel to $3x - 5y = 99$
but passing through $(1, 6)$

Form: $3x - 5y = C$ is \parallel to $3x - 5y = 99$

Point: $3(1) - 5(6) = C$

Solve: $3 - 30 = C$, $C = -27$

Final: $3x - 5y = -27$

• $Ax + By = C$ is \perp to $Bx - Ay = D$

{exchange the coefficients and change one of the signs} : sufficient but not necc'y.

That is to say

$$Ax + By = C \text{ is } \perp \text{ to } Ex + Fy = G$$

if $\boxed{\frac{A}{B} = -\frac{F}{E}}$

(EX) $2x - 3y = 10$ is \perp to $3x + 2y = 222$ (7)

~~$3x + 2y = 222$~~

but $2x - 3y = 10$ is also \perp to $18x + 12y = 1$

ratio: $\frac{2}{-3} = -\frac{1}{\left(\frac{18}{12}\right)}$

$\frac{2}{-3} = -\frac{12}{18}$

$\frac{2}{-3} = -\frac{2}{3}$ ✓

(EX) Find the eqn of a line \perp to $2x - 3y = 10$ passing through $(1, 5)$

Form: $3x + 2y = C$

Point: $3(1) + 2(5) = C$

Solve: $3 + 10 = C$, $C = 13$

Final: $3x + 2y = 13$