

EM&CP Blk PA #9 Walk-Thru Monday, May 4, 2022

PA — Walk-Thru Continued

Chp 3 problems — due 1 week from today

(Plan — finish 2/8 + all of 9 + most — main part — of 10)
1 problem (today)

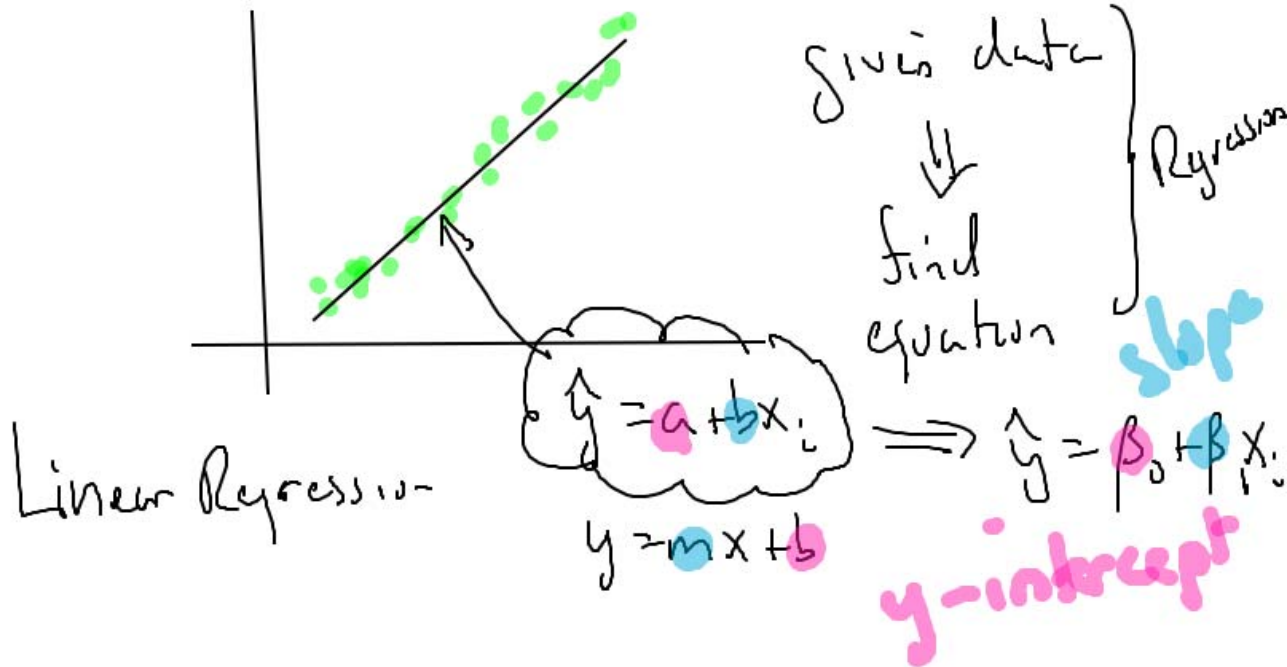
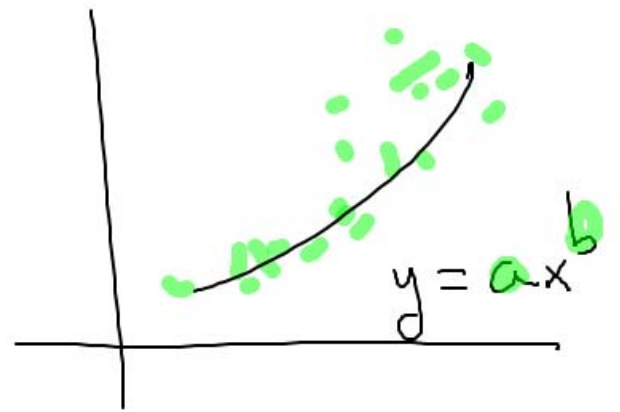
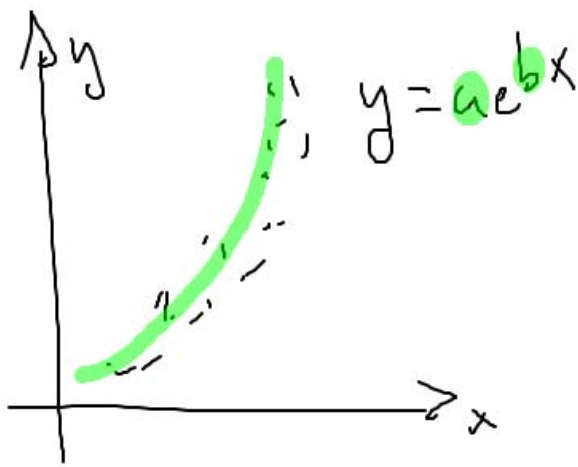
 #6 (~~#5~~) — prime numbers — all shell (no graphical)

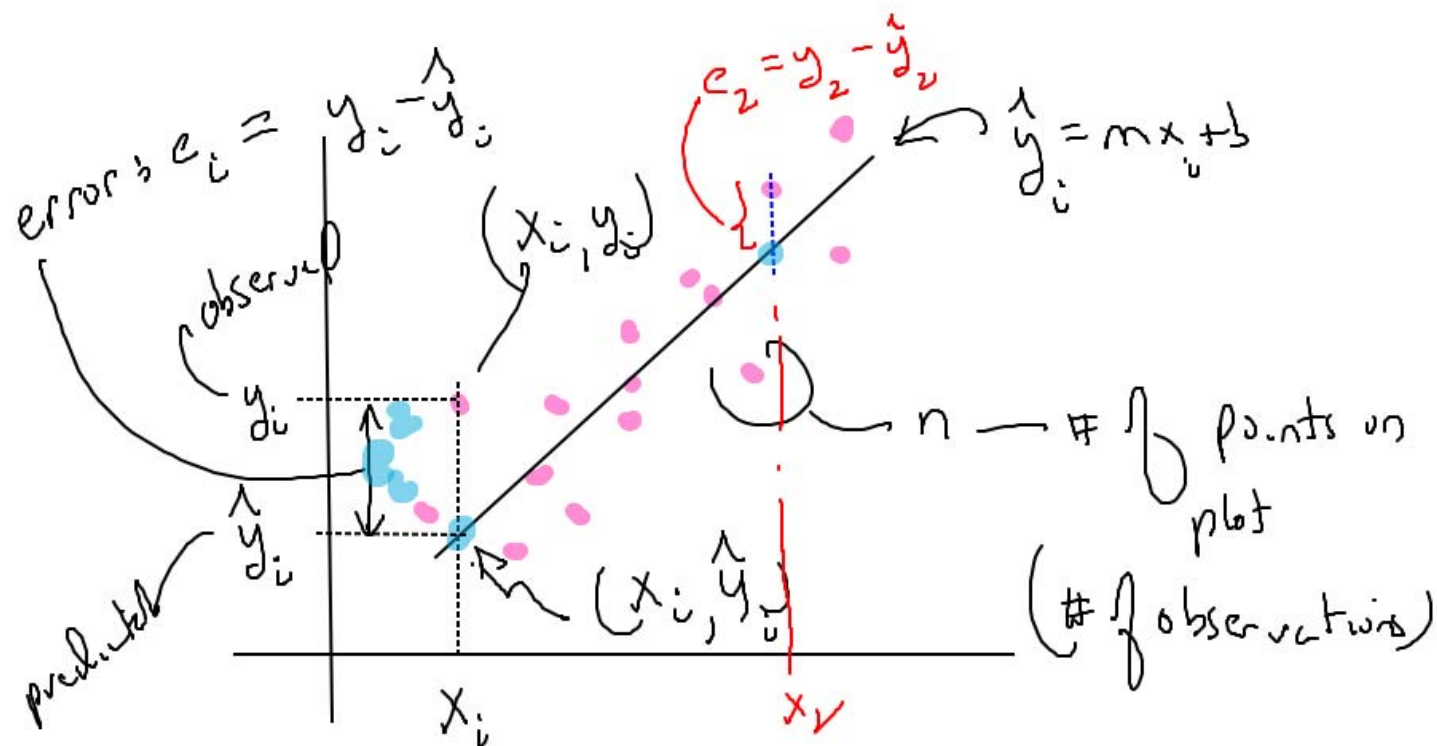
 #13 — all graphical — no shell interaction permitted

⇒



Least Square Linear Regression





"Best Fit" criteria for line

$$\text{MIN} \sum_{i=1}^n e_i^2$$

Least Squares Linear
Regression

$$\hat{y} = mx + b$$

Textbook (pg 281, #13)

$$\bar{x} = \frac{1}{n} \sum x_i$$

mean of x values

$$y = \bar{y} + m(x - \bar{x})$$

$$m = \frac{\sum x_i y_i - n \bar{x} \bar{y}}{\sum x_i^2 - n \bar{x}^2}$$

$$\bar{y} = \frac{1}{n} \sum y_i$$

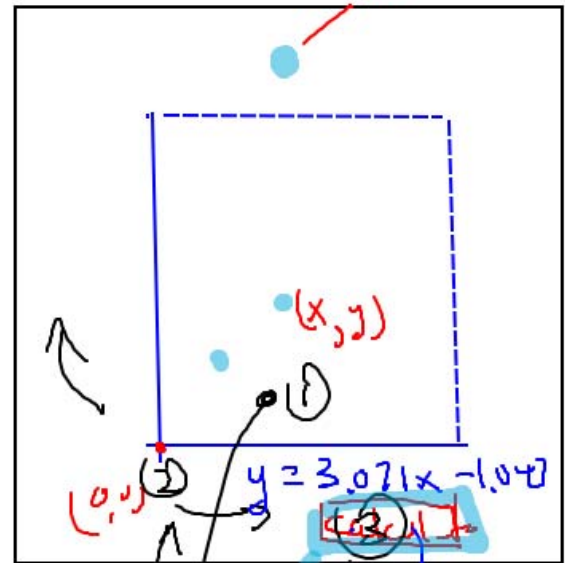
check

$$\sum x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + \dots + x_n^2$$

$$\sum x_i y_i = x_1 y_1 + x_2 y_2 + x_3 y_3 + x_4 y_4 + \dots + x_n y_n$$

$$y = mx + b$$

1/1/20
Suren



running totals/sums

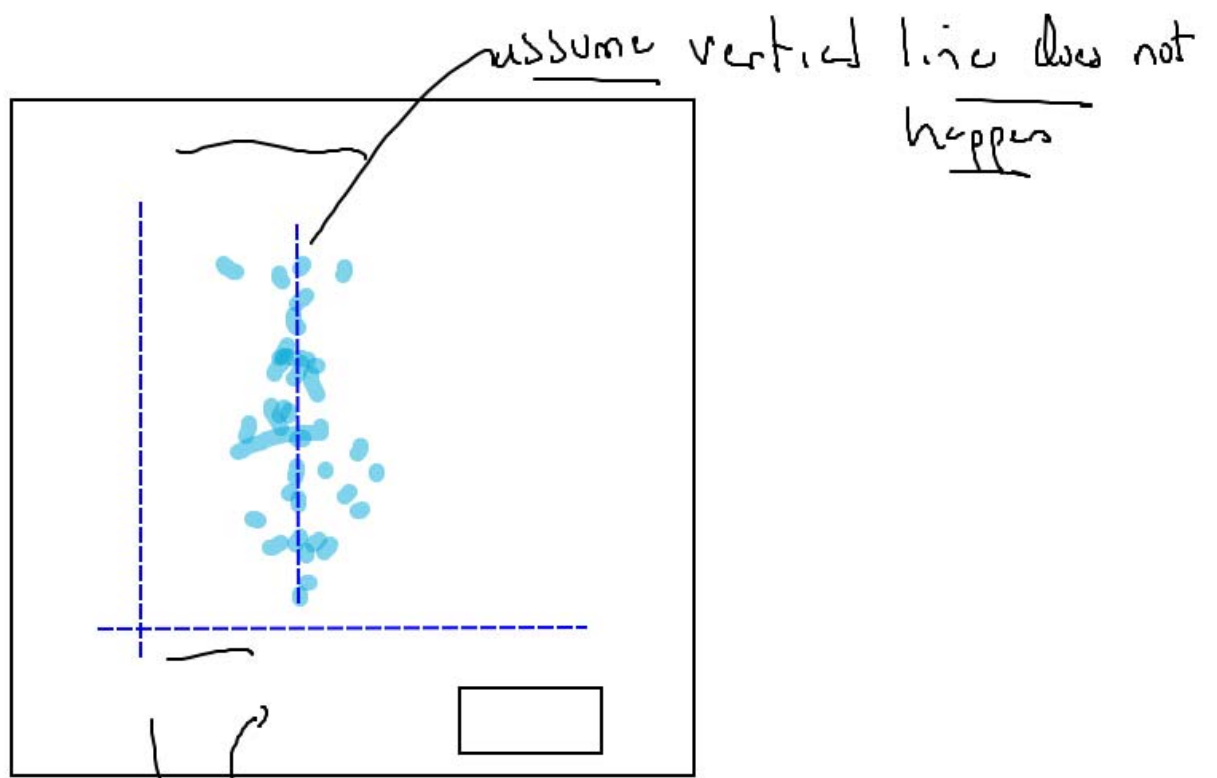
n - # of points

$$\sum x_i \text{ (sum X)}, \sum y_i$$
$$\sum xy \quad \sum x_i^2$$

3 regional

Wrapper
change
close Term

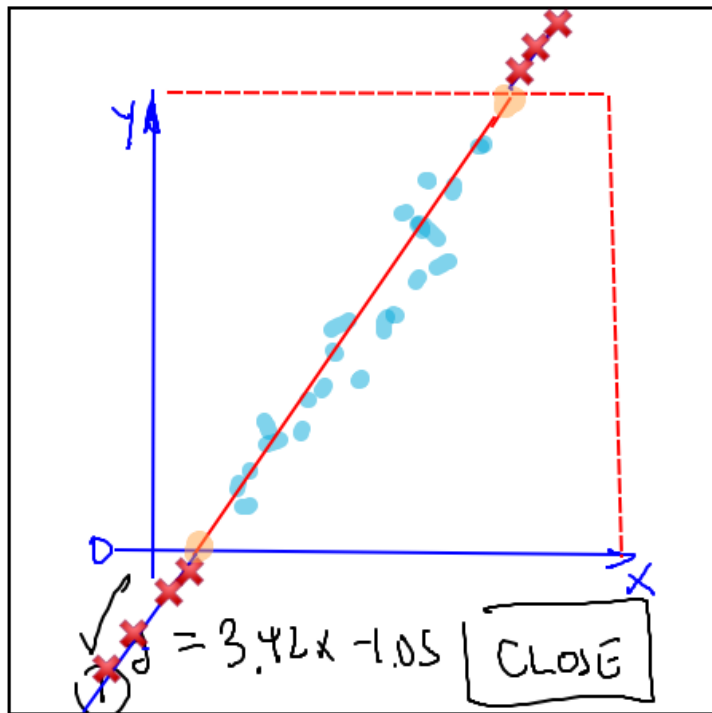
real button



$$y = -2.761x + 0.525$$

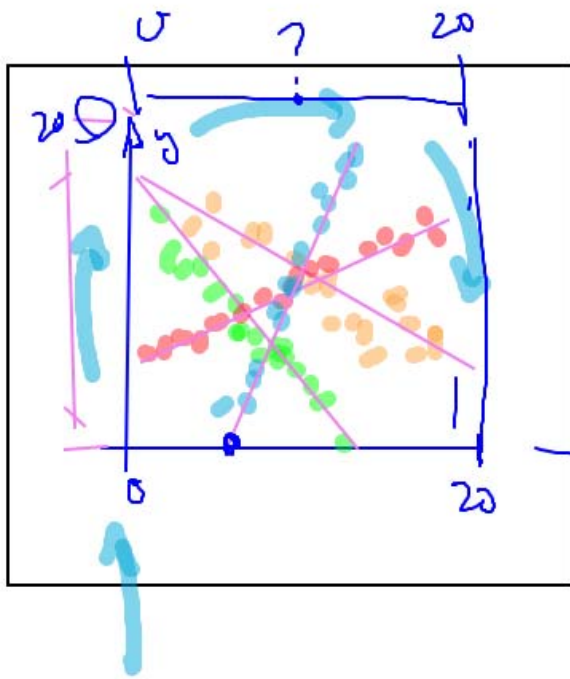
draw line

must { display ①
regression
equation



② draw the
best fit line

(must be "contained"
within the axes
boundary "box")



$$y = 3.14x - 1.043$$

$$3.14x = 1.043$$

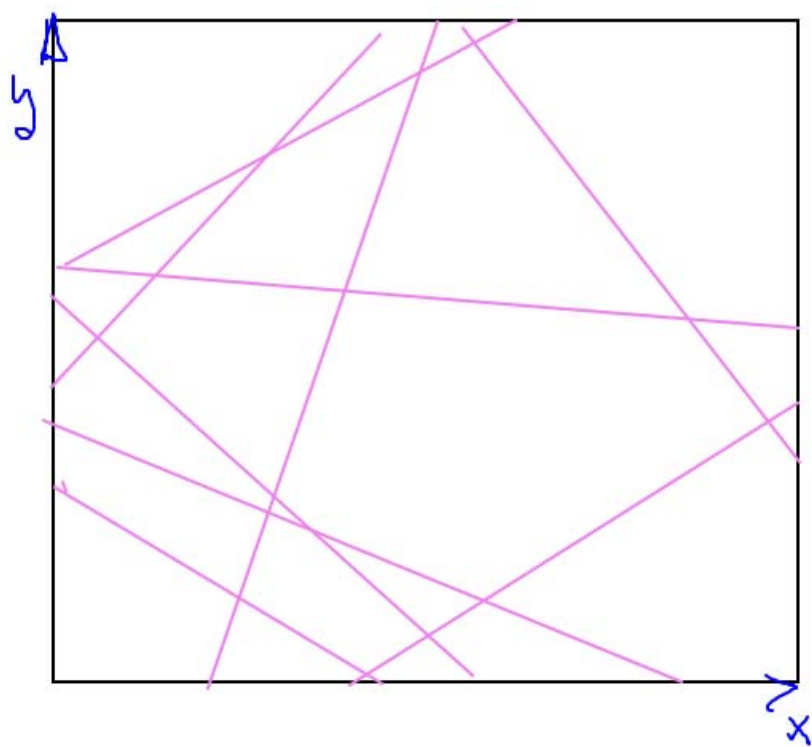
$$x = \frac{1.043}{3.14}$$

$$y = 0$$

$$x = 0 \quad y = -10$$

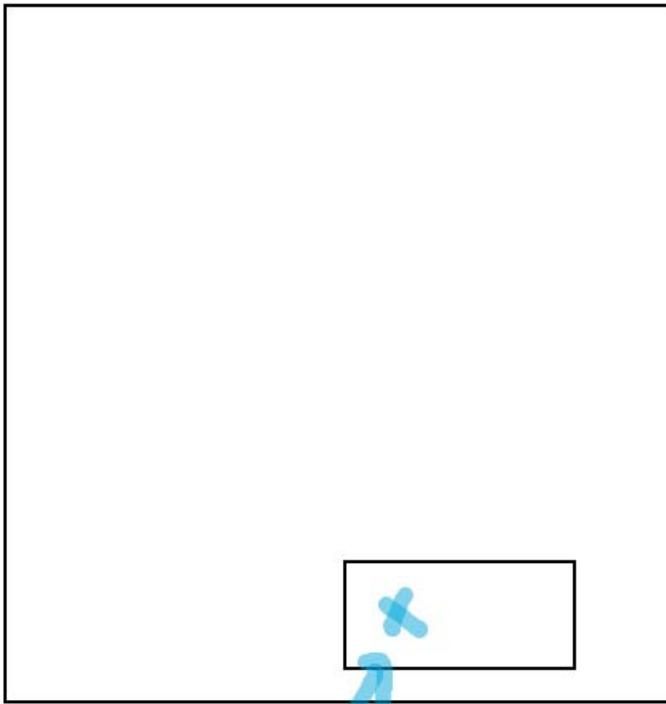
$$y = 20 \quad \text{where is } x?$$

$$x = 2 \quad \text{where is } y?$$



$$m = \frac{\sum x_i y_i - n \bar{x} \bar{y}}{\sum x_i^2 - n \bar{x}^2}$$

$\bar{y} = \frac{1}{n} \sum y$
 $\bar{x} = \frac{1}{n} \sum x$
 $(\bar{x})^2 = \left(\frac{1}{n} \sum x_i \right)^2$
 ~~$\bar{x}^2$~~ **NO!**



function

look to see if click is
within button boundary
box

$$m = \frac{\sum x_i y_i - n \bar{x} \bar{y}}{\sum x_i^2 - n \bar{x}^2} = \frac{\sum x_i y_i - n \left(\frac{1}{n} \sum x \right) \left(\frac{1}{n} \sum y \right)}{\sum x_i^2 - n \left(\frac{1}{n} \sum x \right)^2}$$

$$= \frac{\sum x y - \frac{1}{n} \sum x \sum y}{\sum x^2 - \frac{1}{n} (\sum x)^2} \checkmark$$

$$= \frac{\frac{1}{n} \{ n \sum x y - \sum x \sum y \}}{\frac{1}{n} \{ n \sum x^2 - (\sum x)^2 \}}$$

$$= \frac{n \sum x y - (\sum x)(\sum y)}{n \sum x^2 - (\sum x)^2}$$

slope, m

$$y = \bar{y} + m(\bar{x} - \bar{x})$$

$$y = mx + b$$
$$y - mx = b$$

expand:

$$y = \bar{y} + mx - m\bar{x}$$

$$y - mx = \bar{y} - m\bar{x}$$

b



$$b = \bar{y} - m\bar{x}$$

y-intercept

1st — find m , slope
2nd — find b

HGS Spring Break

APRIL

4th	
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11		13th	14th	15th
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18	
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25	
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Project proposal due

Spring
break -
no class

last full week
no earlier than

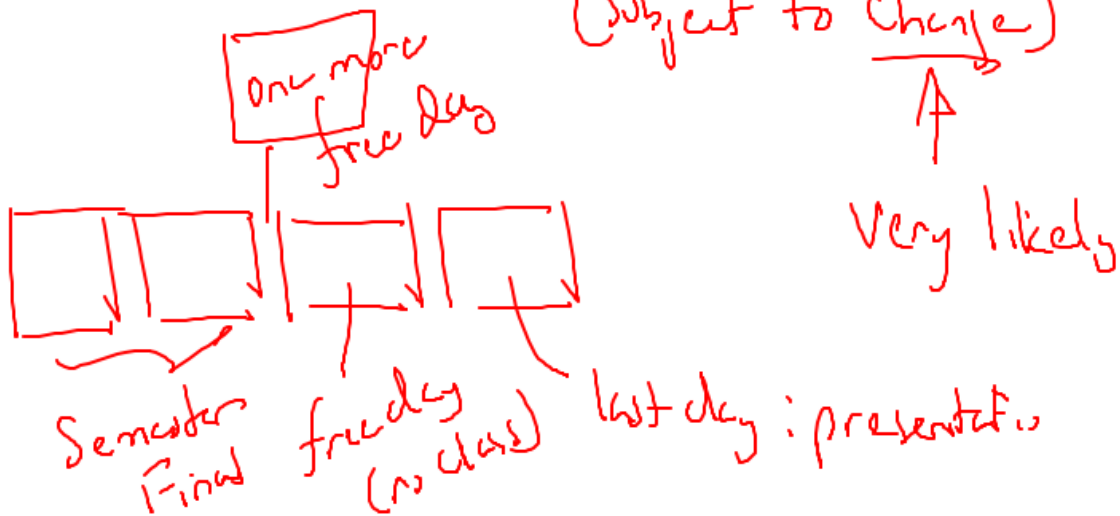
Friday
April 28th 29th

MONDAY	MAY	4th	6th
3rd			

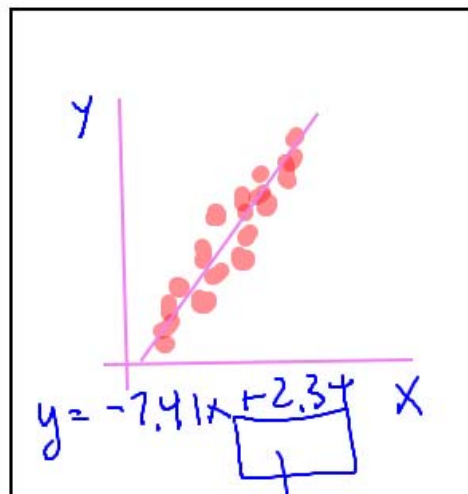
Semester Final:

no earlier than April 28th & 29th
(subject to change)

project due no later than May 4th
(subject to change)



intro



close End Qo.t

Problem #3 — Combo #14 & #15

no shell interaction / all graphical

#4 color → grayscale

