Ch. 1 Review (Financial Algebra)

(#1) What is the line of regression with these points?
(1,7), (6.5, 15), (2,10), (5,22), (6,25), (10,33)

Step 1: create our table!

	x	y	xy	x^2
	1	7	7	1
	6.5	15	97.5	42.25
n=6	2	10	20	4
	5	22	110	25
	6	25	150	36
	10	33	330	100
TOTAL: (Σ)	30.5	112	714.5	208.25

* start by filling in x & y from the coordinates
* Then fill in xy & x^2
* Then get the totals @ bottom (or sums) → simply add the columns

Step 2: Find m and b from the equations!

$$m = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2} = \frac{6(714.5) - (30.5)(112)}{6(208.25) - (30.5)^2}$$

$$m = \frac{4287 - 3416}{1249.5 - 930.25}$$

$$m = \frac{871}{319.25}$$

$$\boxed{m = 2.72} \Rightarrow \text{ROUND } (2.7)$$

$$b = \frac{(\Sigma y)(\Sigma x^2) - (\Sigma x)(\Sigma xy)}{n(\Sigma x^2) - (\Sigma x)^2} = \frac{112(208.25) - (30.5)(714.5)}{6(208.25) - (30.5)^2}$$

$$b = \frac{23324 - 21792.25}{319.25}$$

$$b = \frac{1531.75}{319.25}$$

$$\boxed{b = 4.79} \Rightarrow \text{ROUND } (4.8)$$

Step 3: put all the info together into $y = mx + b$!

$$\boxed{y = 2.7x + 4.8}$$ ← This is an equation for linear regression. yay!!!

Ch.1 Review (Financial Algebra)

(#2) Miguel & the Dole Whips.

$y = 8x - 422$ If the temperature $x = 85°$, how many dole whips will Miguel sell? (or expect to sell?)

Step 1: Notice $x = 85°$ means we can plug this x value into our equation.

Step 2: Plug $x = 85°$ into our equation!

$$\begin{aligned} y &= 8x - 422 \\ &= 8(85) - 422 \\ &= 680 - 422 \\ &= 285 \checkmark \end{aligned}$$

Therefore, Miguel can expect to sell 285 Dole Whips.

(#3) Write an equation in SIGMA NOTATION for the average of 7 values.

Step 1: Start Sigma Notation w/ $\sum x_i$ (always start here).

Step 2: start from the bottom (i = # to start) and tell us when to stop.

$$\sum x_i \Rightarrow \sum_{i=1}^{7} x_i$$

(7 ← stop; $i=1$ ← start)

Note: We're almost done! This literally already tells us how to add up every number, from the 1st to the 7th.

Step 3: Divide by 7, or multiply by $\frac{1}{7}$.

*To get an average, you gotta divide!

$$\Rightarrow \sum_{i=1}^{7} x_i \Rightarrow \boxed{\frac{1}{7}\sum_{i=1}^{7} x_i} \checkmark$$ yay! we are DONE! ☺

#4. What is the STANDARD DEVIATION of the following frequency distribution?

price	frequency
2.75	4
3.95	2
4.95	1
5.45	2
5.99	3

Step 1: How do we calculate SD? ⇒ Look @ equations sheet.

$$SD\ (\sigma) = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x-\bar{x})^2}$$

start here.

Note $\bar{x}$ = mean/Average.

- Let's find $\bar{x}$:

$$\bar{x}\ (\text{mean}) = \frac{2.75(4)+3.95(2)+4.95(1)+5.45(2)+5.99(3)}{12}$$

$$= \frac{52.72}{12} = 4.39$$ ← so, the average price is 4.39.

- Let's calculate $(x-\bar{x})^2$ for every price.

$(2.75-4.39)^2 = (-1.64)^2 = (2.6896)(4) = 10.7584$
$(3.95-4.39)^2 = (-0.44)^2 = (0.1936)(2) = 0.3872$
$(4.95-4.39)^2 = (0.56)^2 = (0.3136)(1) = 0.3136$
$(5.45-4.39)^2 = (1.06)^2 = (1.1236)(2) = 2.2472$
$(5.99-4.39)^2 = (1.6)^2 = (2.56)(3) = 7.68$

Note that although we have calculated $(x-\bar{x})^2$, we aren't done. If each frequency was 1, then we would be. However, we now need to multiply each $(x-\bar{x})^2$ by the frequency at each price!

- Notice that NOW we have officially calculated $(x-\bar{x})^2$

Looking @ the SD equation... we can do $\sum_{i=1}^{n}(x-\bar{x})^2$, AKA – add them all up!

$$\Sigma = 10.7584 + 0.3872 + 0.3136 + 2.2472 + 7.68$$
$$= 21.3864$$

- Next, we can do $\frac{1}{n}\Sigma(x-\bar{x})^2$, or ÷ the sum by 12 (since the sum of freq = 12).

- $\sum_{i=1}^{n}(x-\bar{x})^2 = 21.3864$

Thus $\frac{1}{n}\cdot\sum_{i=1}^{n}(x-\bar{x})^2 = \frac{21.3864}{12} = 1.7822$

WE ARE ALMOST THERE, PEEPS!
(hang in there!)

Again, Recall $SD = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x-\bar{x})^2}$ (we've done this!!!)

- All we have left to do is take the square ROOT!

$SD = \sqrt{1.7822} = 1.334990637$

$\Rightarrow$ Round 1.3 yay!!! We made it! ☺ #FINALLY!

#5 What's the percentile for $320?
- We need relative cumulative Frequency!

price	f	cf	RCF
250	2	2	
275	4	6	
280	1	7	
290	2	9	
310	6	15	
315	2	17	
320	1	18	
325	7	25	
330	1	26	
335	1	27	
340	1	28	
350	2	30	

This is the total # here! n=30.

Step 1: Start by calculating cf (cumulative freq).

Note: 2+4=6
6+1=7
7+2=9 etc.

$\frac{18}{30} = 0.6 \Rightarrow 60^{th}$ percentile!

Step 2: Calculate RCF for $320!

yay! We are done!!! ☺