Data Modeling with Linear Functions.

Employee Turnover The percentage of employees who cease their employment during a year is referred to as employee turnover, and it is a serious issue for businesses. The following table shows the cost, in millions of dollars, to Walmart for a given employee turnover percentage in a year.[13]

percentage (x)

E = employee turnover	10	20	30	40
C = cost	250	400	550	700

millions (-1)

E	C	change in E	change in C	Rate of change in C
10	250			
20	400	20 - 10 = 10	400 - 250 = 150	$\frac{\text{change in } C}{\text{change in } E} = \frac{150}{10} = 15$
30	550	30 - 20 = 10	550 - 400 = 150	$150/10 = 15$
40	700	40 - 30 = 10	700 - 550 = 150	$\frac{150}{10} = 15$
0	?			

Rate of change in a constant, always 15 ← the slope

⇒ C is a linear function of E

we can use a linear function to model the relation between C and E.

Let's write C as the function of E

$$C = 15 \cdot E + b$$

where b is the intercept.

The intercept is the value of C when $E = 0$

we know that when $E = 10$, $C = 250$

Plug $E = 10$ and $C = 250$ into

$$C = 15E + b$$

$$250 = 15 \cdot 10 + b$$

$$\Rightarrow 250 = 150 + b \Rightarrow b = 250 - 150 = 100$$

The linear model is

$$\boxed{C = 15E + 100} \leftarrow \text{Model}$$

E = employee turnover	10	20	30	40
C = cost	250	400	550	700

percentage

Data

millions

$E = 20 \Rightarrow C = 15 \cdot 20 + 100$

$= 300 + 100 = \boxed{400}$

If the turnover is = 70% what is the cost

$C = 15 \cdot 70 + 100 = 1050 + 100$

$= \boxed{1150}$

Assignment 3:

Tuition at American Private Universities The following table shows the average yearly tuition and required fees, in dollars, charged by four-year American private nonprofit universities in the school year ending in the given year.

Date	Average tuition
2012	$27,870
2013	$29,004
2014	$30,138
2015	$31,272
2016	$32,406

← data

D

A

(a) calculate the rate of changes in Average tuition

(b) write a linear function to model the data

(c) Use the linear model to estimate / calculate the tuition of 2024

Take photos of your answer and email me.

Assignment 4

Tax Table Here are selected entries from the 2014 tax table that show the federal income tax owed by those married and filing jointly. The taxable income and the tax are both in dollars.

Taxable income	Tax
72,000	9896
72,200	9926
72,400	9956
72,600	9986
72,800	10,016
73,000	10,046
73,200	10,076
73,400	10,106
73,600	10,136

(a) In Excel

(1) Type in the data

(2) Create columns of

- change in "Taxable income"
- change in "Tax"
- Rate of change of TAX

(b) Graph the data in Excel

(c) write the linear model Equation of Tax on Taxable Income

(d) In Excel, calculate Tax when Taxable income is $100,000

Submit:

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Subscribers
25
20
15
10
5
0
0
5
10
15
20

Assignment 5

Year	Subscribers [hide]
1994	320,000
1995	1,200,000
1996	2,300,000
1997	3,301,000
1998	4,458,000
1999	6,679,000
2000	9,554,000
2001	10,218,000
2002	11,181,000
2003	12,290,000
2004	13,000,000
2005	15,000,000
2006	15,950,000
2007	16,830,000
2008	17,620,000
2009	18,081,000
2010	19,200,000
2012	19,900,000
2014	20,265,000

In Excel,

① Plot the data with the equation of the best fitted line.

② Use the equation to estimate the subscribers of Direct TV in 2023 and 2024

③ Search for the actual subscribers in 2023 and compare this actual number with the estimated number.

Email the Excel file to me by 11:30 AM