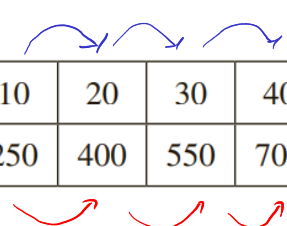


Modeling with Linear Functions

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



$E = \text{employee turnover}$	10	20	30	40
$C = \text{cost}$	250	400	550	700

How much would it cost if the turnover is 50%?

(If $E = 50$, $C = ?$)

Modeling works as follows.

① Start with some data.

→ ② Find a function that best "fit" the data.

③ Use the function to generate "unknown" data,
i.e. making predictions.

we will use linear function to "fit" the data.

we observe that for every 10% increase in the turnover (E)

the cost (C) increases by 150 mil.

So the rate of change for every 1% is a constant

and equal to : $\frac{150}{10} = 15$

Because of the constant rate of change, it is very reasonable to use linear function to model this dataset.

Let find cost function in terms of the turnover. (E)

$$C = (\text{rate of change}) * E + (\text{some number})$$

$$C = 15E + m$$

we need to find m.

we just need to plug in a data point say :

$$E = 10, \quad C = 250$$

$$\Rightarrow 250 = 15 \cdot 10 + m$$

$$\Rightarrow 250 = 150 + m \Rightarrow \boxed{m = 100}$$

So the linear function is

$$\boxed{C = 15E + 100}$$

$$\text{If } E = 50 (\%) \Rightarrow C = 15 * 50 + 100$$

$$\boxed{C = 850}$$

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

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A

- calculate the rate of changes in Average tuition
- write a linear function to model the data
- Use the linear model to estimate / calculate the tuition of 2024