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

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

$= \boxed{1150}$

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