

# REAL WORLD MODELING

1. Uber rates in Kansas City include a \$3 booking fee and \$1.10 base fare as well as \$0.98 per mile traveled. (a) Write a function for the total fare ( $F$ ) in terms of the number of miles ( $x$ ) traveled. (b) What is the total fare for a 14-mile Uber trip?

$$y = mx + b$$

$$F = 0.98x + 4.10$$

$$F = 0.98(14) + 4.10$$

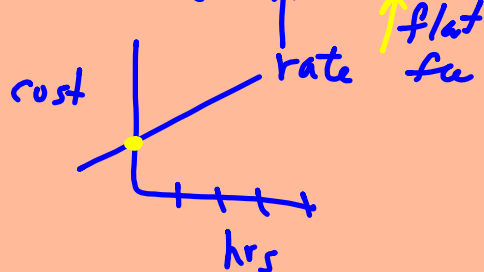
$$F = \$17.82$$

know 2 sets of word.

Point-slope  
 $y - y_1 = m(x - x_1)$

Slope-intercept

$$y = mx + b$$



1. A local plumber charges a service fee plus an hourly rate for labor. She charged \$103.75 for a job requiring 2.5 hours of labor and \$88.70 for a job requiring 1 hour and 48 minutes. (a) Write an equation for total cost ( $C$ ) in terms of the numbers of hours ( $x$ ). (b) What is her hourly charge? (c) What is her service fee? (d) What would be the total charges for an 8-hour job?

$$m = \frac{103.75 - 88.70}{2.5 - 1.8}$$

$$m = \frac{15.05}{0.7} = \frac{1505}{70} = 21.5$$

$$y - y_1 = m(x - x_1)$$

$$y - 88.70 = 21.5(x - 1.8)$$

$$y - 88.70 = 21.5x - 38.7$$

$$y = 21.5x + 50$$

$$C = 21.5x + 50$$

(hrs, Cost)

(2.5, 103.75)

★ (1.8, 88.70)

$$\frac{48}{60} = 0.8$$

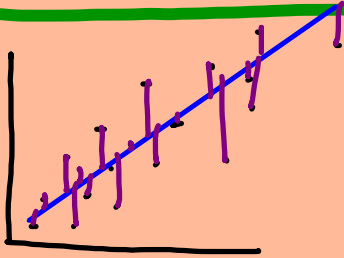
Can afford \$300

$$300 = 21.5x + 50$$

$$\frac{250}{21.5} = \frac{21.5x}{21.5}$$

$$x \approx 11.6 \text{ hrs.}$$

# LINEAR REGRESSION



residuals

$r$  = correlation coefficient  
how strong the relationship  
is between the  $x$  +  $y$  data

$r^2$  = Coefficient of determination  
- how well the line fits the data

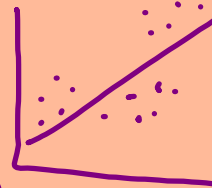
$r^2 \geq 0.75$  good

$0.50 \leq r^2 < 0.75$  fair

$r^2 < 0.50$  poor

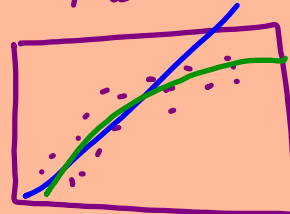
To judge quality of line:

1) Are points evenly  
balanced on either side  
of the line?



2)  $r^2$

3) How well does  
the line predict  
the future?



September 12, 2023

