

1. (6pts) Find the equation of the line (in form $y = mx + b$) that passes through points $(-1, -2)$ and $(2, 3)$.

$$m = \frac{3 - (-2)}{2 - (-1)} = \frac{5}{3}$$

$$y - 3 = \frac{5}{3}(x - 2)$$

$$y = \frac{5}{3}x - \frac{10}{3} + 3$$

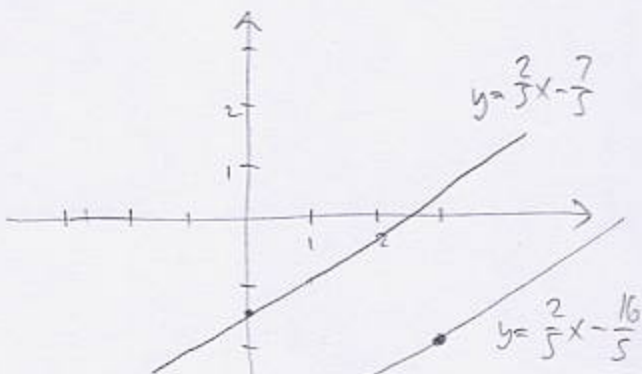
$$y = \frac{5}{3}x - \frac{1}{3}$$

2. (10pts) Find the equation of the line (in form $y = mx + b$) that is parallel to the line $2x - 5y = 7$, and passes through point $(3, -2)$. Draw both lines.

$$2x - 5y = 7 \quad | -7 + 5y \quad y - (-2) = \frac{2}{5}(x - 3)$$

$$2x - 7 = 5y \quad | \div 5 \quad y + 2 = \frac{2}{5}x - \frac{6}{5} \quad | -2$$

$$y = \frac{2}{5}x - \frac{7}{5} \quad y = \frac{2}{5}x - \frac{16}{5}$$



3. (10pts) Use slopes to show that the triangle with vertices $A = (-2, 1)$, $B = (1, 5)$, $C = (9, -1)$ is a right triangle. Do not use the Pythagorean theorem.

Slopes of lines

$$AB = m_1 = \frac{5 - 1}{1 - (-2)} = \frac{4}{3}$$

$$BC = m_2 = \frac{-1 - 5}{9 - 1} = \frac{-6}{8} = -\frac{3}{4}$$

$$CA = m_3 = \frac{1 - (-1)}{-2 - 9} = -\frac{2}{11}$$

} are negative reciprocals,
 so AB and BC
 are perpendicular

4. (4pts) The number of used jets for sale worldwide has increased from 1022 in 1999 to 3014 in 2009. Find the average rate of change in the number of used jets for sale from 1999 to 2009.

$$\text{Avg. rate of chg} = \frac{3014 - 1022}{2009 - 1999} = \frac{1992}{10} = 199.2 \text{ jets/year}$$

5. (10pts) Dougie's Apparel buys a cargo van for \$21,000. It expects the van to last 7 years, at which time they expect to be able to sell it for \$5600. For tax purposes, they need to know the estimated value $V(t)$ in every year of operation.

a) Write a formula for $V(t)$, assuming that it is a linear function (that is, the value decreases by the same amount every year).

b) What is the estimated value of the van after 5 years?

a) is like finding equation of a line through $(0, 21000)$ and $(7, 5600)$

$$m = \frac{5600 - 21000}{7 - 0} = \frac{-15400}{7} = -2200$$

$$y - 21000 = -2200(x - 0)$$

$$y = -2200x + 21000$$

$$\text{so } V(t) = 21000 - 2200t$$

$$\begin{aligned} b) V(5) &= 21000 - 2200 \cdot 5 \\ &= 10000 \end{aligned}$$

(May also do a) as so: van loses 15,400 in value over 7 years, hence $\frac{15400}{7} = 2200$ per year.)

$$\text{Thus, } V(t) = 21000 - 2200t$$

6. (20pts) A grocery store manager experiments weekly with prices of a 9oz bag of kettle-cooked potato chips in order to model the relationship between price and sales. The table shows the data, where P is the price of a bag, and S is the number of bags sold in a week.

a) Draw the scatterplot of the data. Does the relationship look linear?

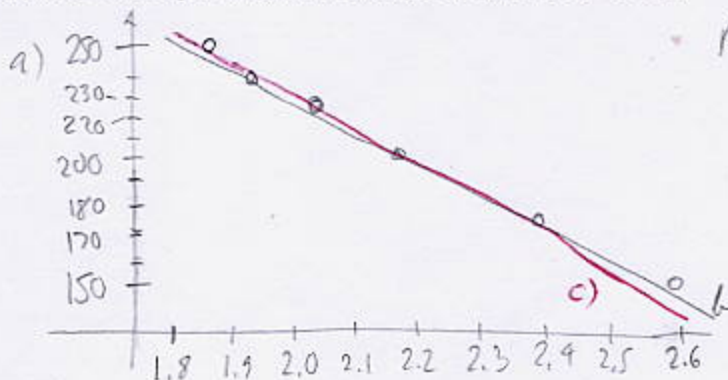
b) Use two points in the scatterplot to get an equation of a line that models the relationship between P and S . Draw the line on the graph.

c) Use your calculator to find the "line of best fit" for the data. Draw the line on the graph.

d) Find the coefficient of correlation r . How strong is the linear relationship between P and S ?

e) What sales does the manager expect if the price is set at \$2.29?

P	S
1.89	250
1.95	231
2.05	222
2.19	198
2.39	175
2.59	152



Relationship looks linear.

$$b) \text{ Use } (1.95, 231) \text{ and } (2.39, 175)$$

$$m = \frac{175 - 231}{2.39 - 1.95} = \frac{-56}{0.44} =$$

$$= -127.272727$$

$$y - 231 = -127.2727(x - 1.95)$$

$$y = -127.2727x + 479.1818$$

$$c) y = -134.777859x + 498.033139$$

d) $r = -0.992824$, close to -1 , so the linear relationship is strong

e) Use line of best fit:

$$y(2.29) = 189.39184$$