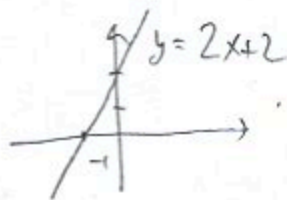**1.** (6pts) Find the equation of the line (in form $y = mx + b$) that has x-intercept -1 and y-intercept 2.

Line goes through $(-1, 0)$ and $(0, 2)$.

$m = \dfrac{2-0}{0-(-1)} = 2$ $y = 2x + 2$
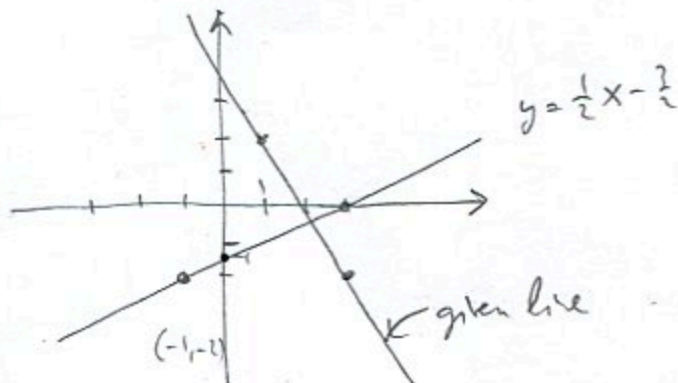
$y = 2x + 2$

2. (10pts) Find the equation of the line (in form $y = mx + b$) that passes through point $(-1, -2)$ and is perpendicular to the line with slope -2 that goes through the point $(3, -2)$. Draw both lines.

Slope of perpendicular line

is $-\dfrac{1}{-2} = \cdot \dfrac{1}{2}$

$y - (-2) = \cdot \dfrac{1}{2}(x - (-1))$

$y + 2 = \cdot \dfrac{1}{2}x + \dfrac{1}{2}$

$y = -\dfrac{1}{2}x - \dfrac{3}{2}$

$y = \dfrac{1}{2}x - \dfrac{3}{2}$

$(-1, -2)$ given line

3. (8pts) Draw the lines $2x - 3y = 6$, $2x - 3y = 12$, $7x + 5y = 10$ and $7x + 5y = 30$. Use slopes to determine if the quadrilateral that these lines form is a

a) parallelogram yes   b) rectangle. no
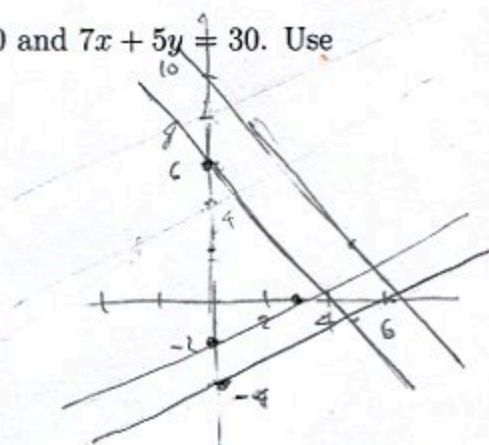
Ⓐ $2x - 3y = 6$
$3y = 2x - 6$
$y = \dfrac{2}{3}x - 2$

Ⓒ $7x + 5y = 10$
$5y = -7x + 10$
$y = -\dfrac{7}{5}x + 10$

Ⓑ $2x - 3y = 12$
$3y = 2x - 12$
$y = \dfrac{2}{3}x - 4$

Ⓓ $7x + 5y = 30$
$5y = -7x + 30$
$y = -\dfrac{7}{5}x + 6$

Lines A and B are parallel (have same slope) and so are lines C and D

No two are perpendicular since $\dfrac{2}{3}$ and $-\dfrac{7}{5}$ are not opposite reciprocals

4. (4pts) To cut costs, many corporations have been selling their private jets. The number of used jets for sale has increased from 1022 in 1999 to 3014 in 2009. What is the average rate of change in the number of used jets for sale from 1999 to 2009? What are the units for the average rate?

avg. rate of change $= \dfrac{3014 - 1022}{2009 - 1999} = \dfrac{1992}{10} = 199.2$ jets/year

5. (12pts) Antonio is the customer of a electric company. In one month he used 1220 kilowatt-hours and paid \$149.90. In another month he used 2358 kilowatt-hours and paid \$275.08.

a) Assuming that monthly cost $C(x)$ is a linear function of kilowatt-hours used x, write a formula for $C(x)$.

b) How much does Antonio pay if he uses 0 kilowatt-hours? What is the meaning of this number?

c) What is the meaning of the slope in this example?

a) Need a line through $(1220, 149.9)$ and $(2358, 275.08)$

$$m = \frac{275.08 - 149.9}{2358 - 1220} = \frac{125.18}{1138} = 0.11$$

$$y - 149.9 = 0.11(x - 1220)$$

$$y = 0.11x - 134.2 + 149.9$$

$$y = 0.11x + 15.7$$

$$C(x) = 0.11x + 15.7$$

b) $C(0) = 15.7$. This is the fixed. monthly charge

c) Slope $= 0.11$, price per kilowatt -hour

(11c per kWhr)

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6. (20pts) A researcher is studying the number of chirps crickets emit in a ~~minute~~ and the ambient temperature in order to model the relationship between the number of chirps and the temperature. The table shows the data: n is the number of chirps per minute, and T is the temperature in °F. Solve the problems below with accuracy 6 decimal points.

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 n and T. 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 n and T?

e) What temperature does the researcher expect if crickets chirp 125 times per minute?

n	T
75	55
82	59
92	61
101	64
115	64
140	70
157	77

a) looks linear
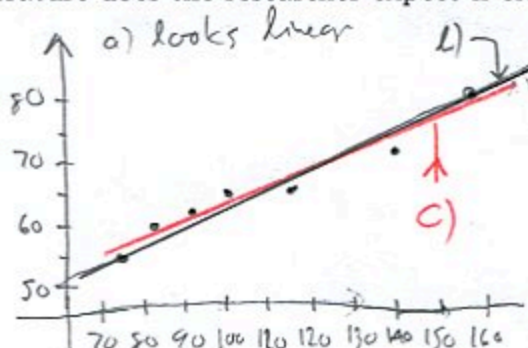
b) Line through $(75, 55)$ and $(157, 77)$

$$m = \frac{77-55}{157-75} = \frac{22}{82} = 0.268292$$

$$y - 55 = 0.268292(x - 75)$$

$$y = 0.268292x + 34.878049$$

c) $y = 0.235118x + 38.691427$

d) $r = 0.97906$ close to 1, so strong

e) expected temp. is $T = 0.235118 \cdot 125 + 38.691427 = 68.253012$ °F   About 68°F