College Algebra — Joysheet 2
MAT 140, Fall 2016 — D. Ivanšić

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Covers: 1.3, 1.4 *Show all your work!*

1. (10pts) Find the equation of the line (in form $y = mx + b$) that passes through point $(1, 4)$ and is parallel to the line $4x - 5y = 1$. Draw both lines.

$4x - 5y = 1$

$-5y = -4x + 1 \quad | \div(-5)$

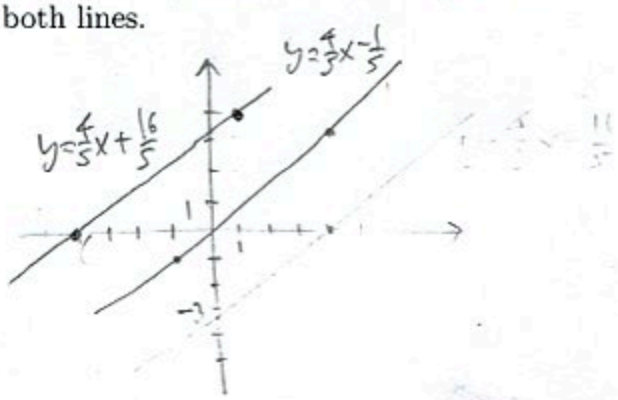
$y = \frac{4}{5}x - \frac{1}{5}$

$m = \frac{4}{5}$

$y - 4 = \frac{4}{5}(x - 1)$

$y = \frac{4}{5}x - \frac{4}{5} + 4$

$\boxed{y = \frac{4}{5}x + \frac{16}{5}}$



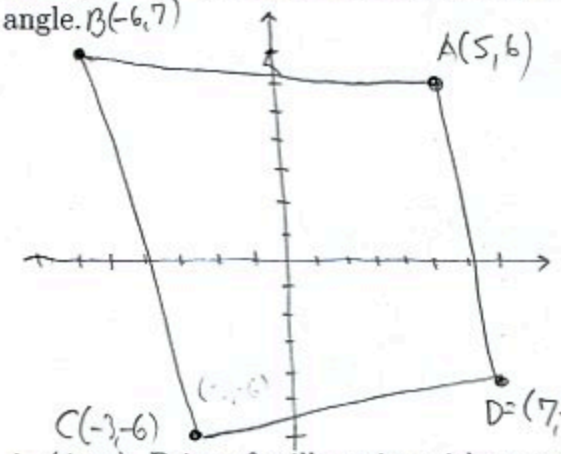
2. (5pts) Find the linear function f its x-intercept is -4 and its y-intercept is 1.

Goes through $(-4, 0), (0, 1)$

So $m = \frac{1-0}{0-(-4)} = \frac{1}{4}$

$\boxed{y = \frac{1}{4}x + 1}$

3. (9pts) Draw the quadrangle with vertices $A = (5, 6)$, $B = (-6, 7)$, $C = (-3, -6)$ and $D = (7, -4)$. Use slopes to determine if the any of the angles in the quadrangle is a right angle.



Calculate slopes of lines:

AB: $\frac{7-6}{-6-5} = -\frac{1}{11}$

BC: $\frac{-6-7}{-3-(-6)} = -\frac{13}{3}$

CD: $\frac{-4-(-6)}{7-(-3)} = \frac{2}{10} = \frac{1}{5}$

DA: $\frac{6-(-4)}{5-7} = \frac{10}{-2} = -5$

are opposite reciprocal, so lines AD, CD are perpendicular

4. (4pts) Price of milk varies with season. In January, the average U.S. price of a gallon of milk was \$3.313. In July, it was \$3.062. What is the average rate of change of the price of milk from January to July? What are the units for the average rate of change?

$\frac{3.062 - 3.313}{7 - 1} = \frac{-0.251}{6} = -0.0418333$ dollars per month

(price drops about 4.2¢ per month, on average)

5. (12pts) A family keeps track of their electric bill. One month, they used 1258 kilowatt-hours and paid \$174.73. Another month, they used 980 kilowatt-hours and paid \$139.98.
a) Assuming that the cost of electricity $C(x)$ is a linear function of kilowatt-hours x used, write a formula for $C(x)$.
b) How much would they pay for 0 kilowatt-hours used? What is the meaning of this number?
c) What is the meaning of the slope in this example?

a) Need equation of the line through $(1258, 174.73), (980, 139.98)$

$$m = \frac{139.98 - 174.73}{980 - 1258} = \frac{-34.75}{-278} = 0.125$$

$$y - 174.73 = 0.125(x - 1258)$$

$$y = 0.125x - 0.125 \cdot 1258 + 174.73$$

$$y = 0.125x + 17.48 = C(x)$$

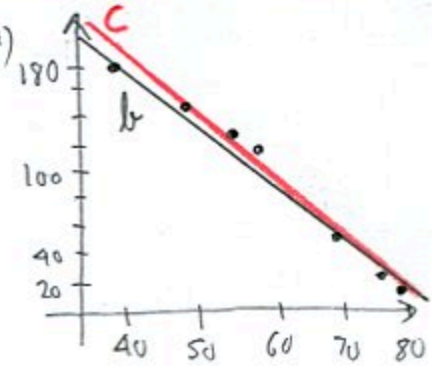
b) $C(0) = 17.48$ is the flat monthly fee

c) slope is cost per kilowatt-hour

6. (20pts) A clothing store manager is trying to establish the relationship between the price of a pair of jeans and the weekly number of jeans sold. The table shows the data: P is the price in dollars and S is the number of jeans sold by the store in a week. 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 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 amount of sales does the manager expect if the price is set at \$64?

P	S
39	180
49	142
54	126
57	120
69	55
76	27
79	18

a)



Yes, it looks linear.

b) Use $(39, 180)$ and $(69, 55)$

$$m = \frac{55 - 180}{69 - 39} = -\frac{125}{30} = -4.166667$$

$$y - 55 = -\frac{125}{30}(x - 69)$$

$$y = -\frac{125}{30}x + \frac{125}{30} \cdot 69 + 55 = -4.166667x + 342.5$$

c) $y = -4.199759x + 349.214004$

d) $r = -0.996177$ close to 1, so strong linear relationship

e) $-4.199759 \cdot 64 + 349.214004 = 80.429428$