Linear Models I   *Franz Helfenstein*   **Name** _____

Answers must be clearly **legible**, **simplified** and **boxed** or **circled**. Unless otherwise stated write answer as an **exact** integer, fraction or use **two** decimal accuracy. **Units** required where appropriate.

1)   Find the equation (in **slope-intercept** form) for the line through (3.2 , 1.6) & (2.5 , –6.1). Show your work.

Now find the line's equation by using the TI's **Linear Regression** feature. Are they equal?

If they were not equal, what would that indicate?

2)   Use the TI's built-in **Linear Regression** feature to estimate the line best approximating:

(1,17) (2,29) (3,41) (4,62) (5,75)   y =

3)   When plotting snow depth vs. elevation, which should be the vertical and which should be the horizontal variable?

Horizontal: _____   Vertical: _____

Explain your reasoning:

4)   When plotting blood pressure vs. age, which should be the vertical and which should be the horizontal variable?

Horizontal: _____   Vertical: _____

Explain your reasoning:

5)   When plotting fire hazard vs. humidity, which should be the vertical and which should be the horizontal variable?

Horizontal: _____   Vertical: _____
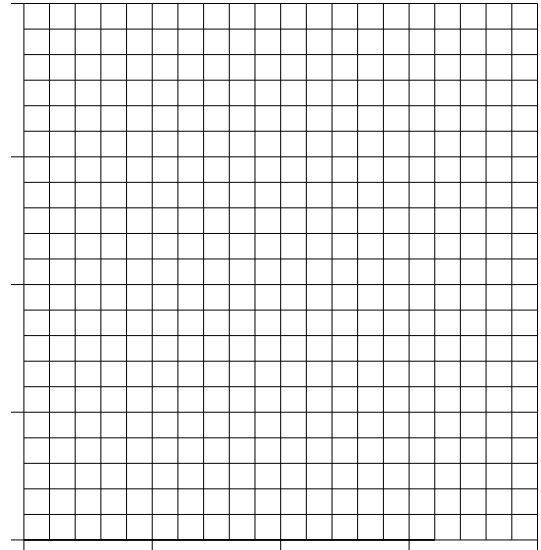
Explain your reasoning:

Problems 6 – 10 refer to the data in the T-table which represents <u>average tree diameter</u> for similar aged trees at <u>various elevations</u>.

6)   Which variable is the independent, which is the dependent? That is, which should associate with x and which with y? Explain.

Elev. (ft)	Diam. (in)
2,600	33
2,800	31
3,000	25
3,200	22
3,400	19
3,600	18

7)   Graph the data. Label the axes and be sure to include the scales.

8a)   Draw <u>your</u> "best fit" line for this data and find that equation. Show your work.

8b)   Use the TI to find the "best fit" line. It should be <u>similar</u> to the one you drew. Why?

9a)   Use the TI's equation to predict timberline elevation.

9b)   Use the TI's equation to predict the diameter of the trees at 2000 ft.

10a) Use the TI's equation to predict maximum tree diameter.

10b) Use the TI's equation to predict the elevation at which tree diameter will be 10".

Linear Models II   *Franz Helfenstein*   **Name**

Answers must be clearly **legible**, **simplified** and **boxed** or **circled**. Unless otherwise stated write answer as an **exact** integer, fraction or use **two** decimal accuracy. **Units** required.

1a)   Find the average speed using the points indicated.

5 ft

5   10 sec
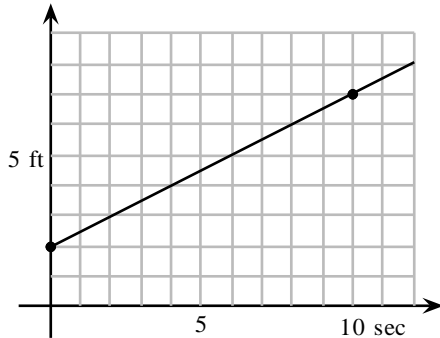
1a)   Find the flow rate in gpm? Is this a discharge or fill-up?

gal

5

5   min
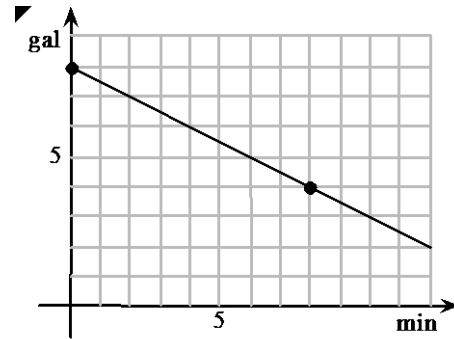
Questions 2 – 5 refer to the following story:

Mack and Jill are having a race up the hill to fetch a pail of water. Mack can run a bit faster than Jill so he gives her a 40 ft head start. Mack averages 12.1 ft/sec. Jill averages 9.9 ft/sec.
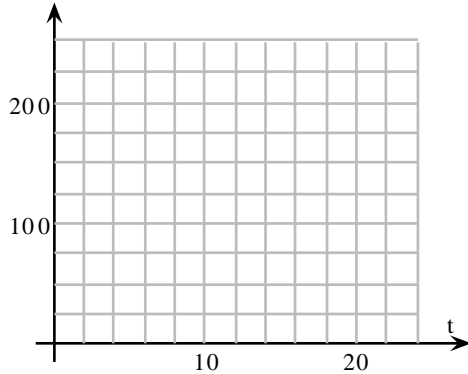
2a)   Give an equation for Mack's position at time t.

   M =

2b)   Give an equation for Jill's position at time t.

   J =

3)   Sketch the Distance vs. Time plots of Mack and Jill's race.

200

100

10   20   t

4)   Using your graphing calculator to determine at what **time** Mack and Jill pass each other in the race.

5a)   Using your graphing calculator to determine who wins if the race is 225 ft. How far behind is the loser?

   _____ wins by _____ ft

5b)   Using your graphing calculator to determine who wins if the race lasts 18 seconds. How far behind is the loser?

   _____ wins by _____ ft

6) Suppose 'y' denotes water quality in ppm of contaminant and 'x' denotes distance from a fueling station.

    (a) What does a slope of zero represent?   (b) What does a negative slope represent?

7) Use this data and the TI's regression feature to answer the following questions.

Distance	25'	50'	75'
PPM	890 ppm	620 ppm	380 ppm

    (a) What contamination would you expect right at the fueling station?

    (b) At what distance would you expect the contamination to finally hit zero?

Questions 8 – 10 refer to the following graph:

A company buys a machine to produce souvenirs. The plot shows their *production cost.*
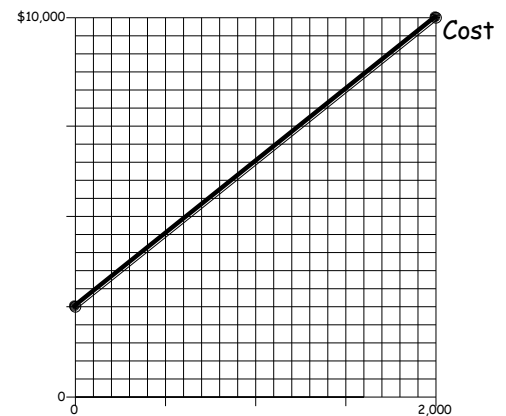
8)   (a) What is the cost of the machine (fixed cost)?

    (b) Once the machine is paid for, what does it cost to produce each item (variable cost)?

    (c) Does the company save money on production cost by producing large quantities? Why/why not?

Use this data and the TI's regression feature to answer the following questions.

9a) Considering this Selling Price vs. # Sold, which should be the dependent variable?

Selling Price	$20	$22.50	$25
# Sold	1524	1248	1010

9b) Find an equation that represents # Sold as a function of Selling Price.

10a) What selling price will generate 2000 souvenirs sold?

10b) What selling price will generate zero souvenirs sold?

10c) If the selling price is set to $15, what will the company's net profit be?