Math E-3
Assignment 10   Total possible points: 60

NAME:

Note: For all the following problems, be sure to <u>label</u> all axes and insert a title of some kind. Make sure your intervals on the axes are even. Remember, do not break the x-axis unless you feel extremely comfortable with graphing techniques. Use Examples 3 and 4 from the reading as models for problems 5-24.

Problems 1-4

For these problems, do not find regression equations. Here we are learning to interpolate and extrapolate using only two data values.

The Life Expectancy of men and women born in the United States increased each decade from 1900 to 1950. The data for <u>two</u> of those decades appears below as well as a graph showing these data.

Year	Male Life Expectancy (Years)	Female Life Expectancy (Years)
1930	58.1	61.6
1940	60.8	65.2
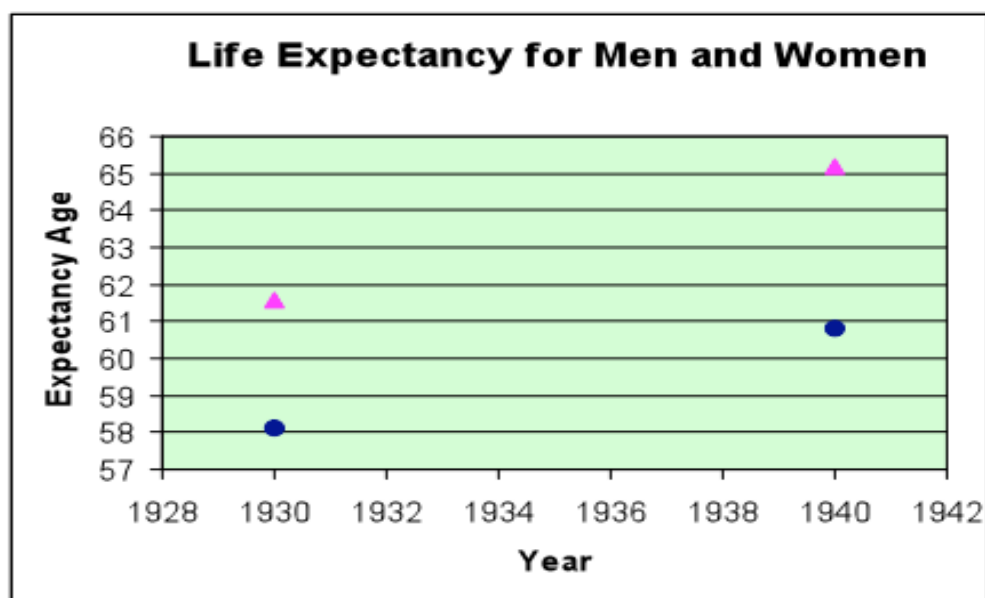
1) The values for men and women for this data have been plotted on the same set of axes. Draw in the lines on the chart above that connect the two values. You will have two separate lines: One for men and one for women. Notice how much steeper the line for women is. What does that tell you? (2 points)

Use linear interpolation as demonstrated in Example 1 in the lecture notes to answer the questions that follow.

2) Using linear interpolation, determine the approximate life expectancy of men and women in 1934. (4 points)

3) Using extrapolation, determine the approximate life expectancies for men and women in 1960. (4 points)

4) How confident are you of your predictions? Are you as sure of the extrapolation as the interpolation? Why or why not? (2 points)

Problems 5-11

Some economists believe that as the prime interest rate increases, the value of stocks decreases. The table below gives data collected over a certain time period, comparing the prime rate with the value of a particular stock.

Prime Rate as a %	10	6	5	7	12	8	9
Stock Price in Dollars	60	80	90	70	50	65	60

5)   Graph the data on a scatterplot below. Put the prime interest rate on the horizontal axis.

Why?_____ (2 points)

6)   By eye, draw below a regression line below that best represents the *trend* of the data. (2 points)
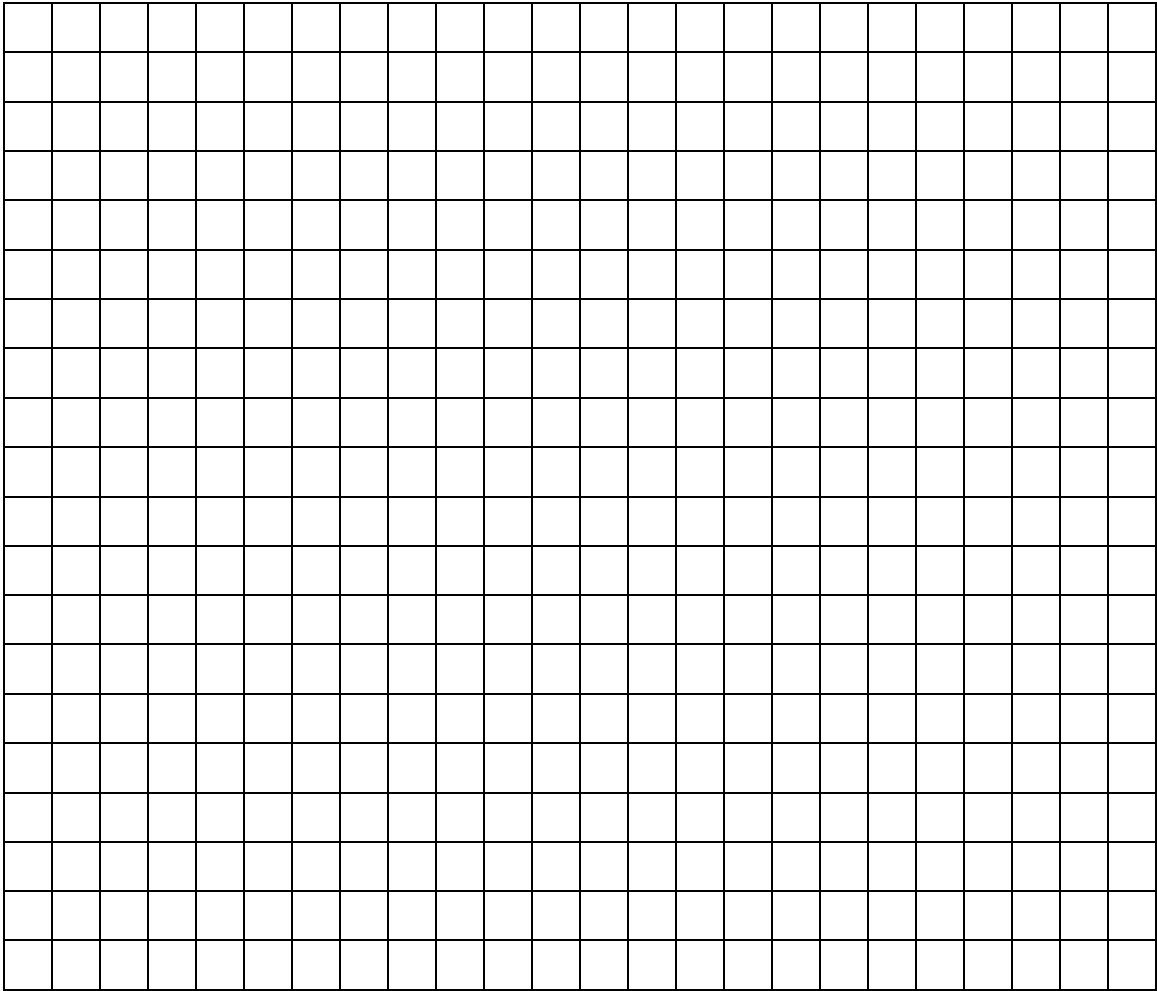
7)   Describe in words the kind of correlation between the two variables. Give an estimate for
       Pearson's r-value.   (2 points)

       Description of correlation:

       Estimate of Pearson's r value:

8)   Find the equation of your regression line. In your work, show the calculation of slope. Use either
the y-intercept that you drew above in your graph, or use a point on your line to calculate the y-intercept.
Either method is acceptable.   (4 points)

9)   Describe in words what the slope AND y-intercept mean for these data. (2 points)

Meaning of slope:

Meaning of y-intercept:

10) Use your <u>equation</u> to predict the stock prices which correspond to the following **prime interest rates:** (do not estimate the answers from your graph although these estimates should match your answers calculated *from your equation*.) (4 points)

   i) 11%

   ii) 1%

   iii) 15%

   iv) 30%

11) Do any of your answers from question 10 look unrealistic? Discuss possible reasons. (1 point)

Problems 12 -18

A pharmaceutical researcher wishes to know, as precisely as possible, the effect that a new drug will have on the human pulse rate. To investigate this effect, he administers different doses of the drug to each of seven randomly selected patients, and he notes the increase in their pulse rates one hour later.

Patient	A	B	C	D	E	F	G
Dosage in cubic cm, cc's	1.5	2	2.5	1.5	3	2	2.5
Change in the pulse rate in beats/min	8	10	14	10	15	11	12

12)   Draw a scatterplot of the data. Put the dosage on the horizontal axis.

 Why?_____   (2 points)

13)   Draw by eye the best fitting regression line below.   (2 points)
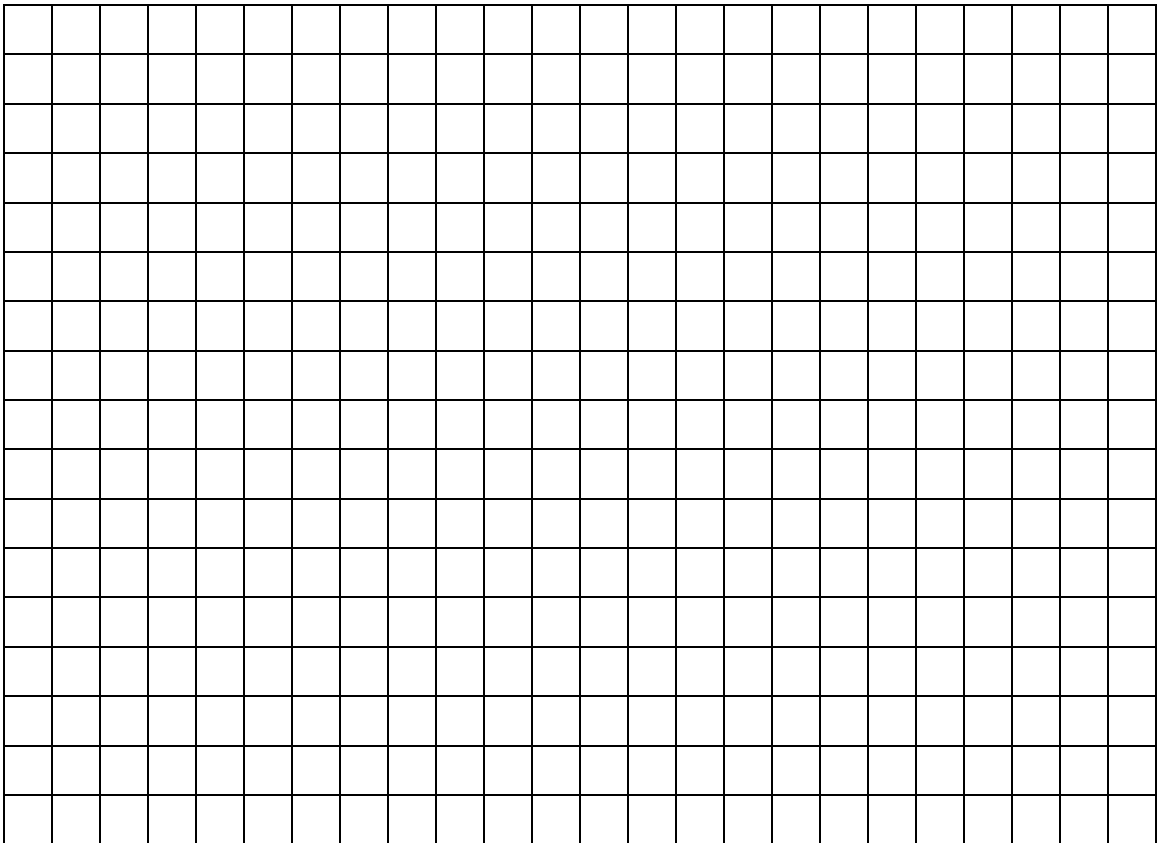
14)   Describe in words the kind of correlation between the two variables. Estimate an 'r' value for
        your relationship.   (2 points)

        Description of correlation:

        Estimation of r value:

15)   Find the equation of your regression line. In your work, show the calculation of slope. Use either
        the y-intercept that you drew above in your graph, or use a point on your line to calculate the y-intercept.
        Either method is acceptable.   (4 points)

16) Describe in words what the slope and the y-intercept of your equation mean for these data.
    (2 points)

Meaning of slope:

Meaning of y-intercept:

17) Use your regression line to predict the change in pulse rate which corresponds to the
    following dosages: (3 points)

 i) 2.8 cc's

 ii) 4.0 cc's

 iii) 8.0 cc's

18) Do any of these answers seem unreasonable? Why? (1 point)

Problems 19 - 24

A student athlete noticed that his race times were affected by the amount of sleep that he got the night before a race. To understand this factor better, he recorded his nightly sleep in hours and his performance in a 5k race the following day.

Hours of sleep	8	7.5	5.5	9	6	8.5
Time (minutes)	16.5	16.3	17.2	16.2	17	16

19)   Graph the data on a scatterplot below. Put the hours of sleep on the horizontal axis.

Why? _____ (2 points)

20)   Draw by eye the best fitting regression line below. (2 points)
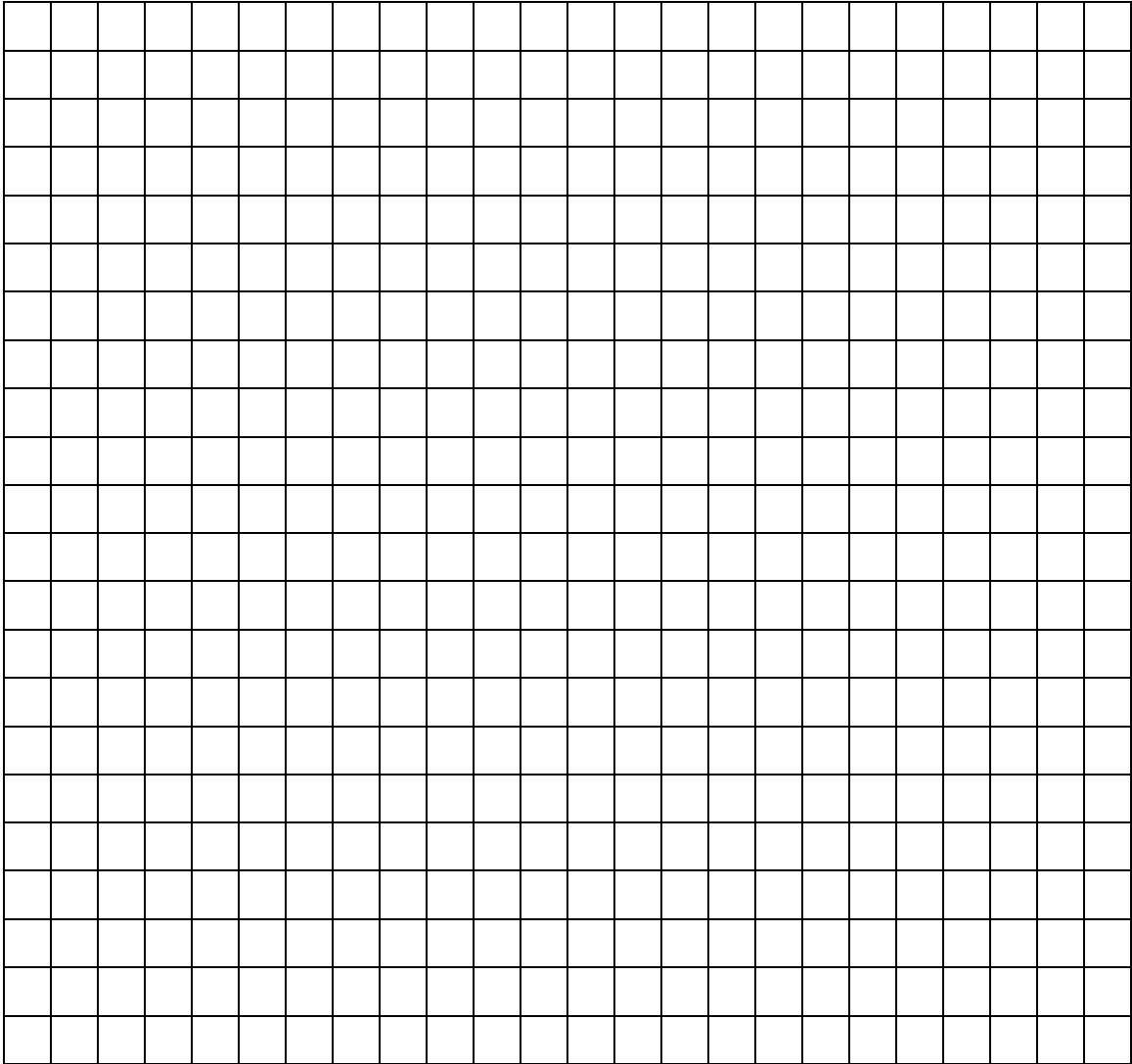
21)   Describe in words the kind of correlation between the two variables. Give an estimate for
       Pearson's r-value.   (2 points)

       Estimate of Pearson's r value:

22)   Find the equation of your regression line. In your work, show the calculation of slope. Use either the y-intercept that you drew above in your graph, or use a point on your line to calculate the y-intercept. Either method is acceptable.   (4 points)

23) Describe in words what the slope **AND** y-intercept mean for these data. (2 points)

Meaning of slope:

Meaning of y-intercept:

24)   Use your <u>equation</u> to predict the race times which correspond to the following nightly sleep times**:** (do not estimate the answers from your graph although these estimates should match your answers calculated *from your equation.*)   (3 points)

i)   4 hours

ii)   7 hours

iii)   10 hours