

Math 282 HW3 due Friday, Sept. 13. Late policy. No late HW will be accepted (except for an emergency, illness). You may turn in HW early if you know that you will miss Friday. If you miss a quiz, contact me before the next class period, and take it during Thursday office hours (up to 2 lates). **Two pages: problems A)-H)**

A) Measurements from dinosaur skeletons are below.
Find the correlation r . (It is near 1.0.)

femur =	x	38	56	59	64	74
humerus =	y	41	63	70	72	84

comment: Show computations for the mean and SD of x and y (SDs near 13.2 and 15.9). Make the table with columns x , y , zx , zy , and product.

B) 4.38 A college newspaper interviews a psychologist about student ratings of faculty teaching. The psychologist says "The evidence indicates that the correlation between research productivity and teaching rating of faculty members is close to 0." The paper reports that "Good researchers tend to be poor teachers and vice versa." Explain why the paper is wrong and explain the psychologist's meaning without using technical terms like "correlation."

comment: The psychologist says $r = 0$ and the newspaper is using r close to -1 . What does $r = 0$ mean in words?
(Assume that the two variables are linearly related.)

C) 4.39 Explain why each of the following statements is wrong.

- "There is high correlation between gender of American workers and their income."
- "We found a high correlation ($r = 1.09$) between students' ratings of faculty teaching and ratings made by other faculty members."
- "The correlation between planting rate and yield of corn was found to be 0.23 bushel."

comment: See pages 106-107. See final answer in the back of the book.

D) 5.8abd How does fuel consumption y of a car change as its speed x increases?

speed(km/h)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
fuel used	21	13	10	8	7	5.9	6.3	6.95	7.57	8.27	9.03	9.87	10.79	11.77	12.83
residuals	10.09	2.24	-0.62	-2.47	-3.33	-4.28	-3.73	-2.94	-2.17	-1.32	-0.42	0.57	1.64	2.76	3.97

The equation of the least squares regression line is $\hat{y} = 11.058 - 0.01466x$.

a) Make a scatterplot of the observations (x on the horiz. and y on the vert. axis) and draw the regression LS line on the plot.

D) CONTINUED

b) Would you use the regression line to predict y from x ? Explain.

d) Make a plot of the residuals (vert. axis) vs x (horiz. axis). Draw a horizontal line at height zero on your plot.

comment: When you draw the LS line, use $x = 10$ and $x = 150$.
See ex. 5.5 on p. 135 and see p. 137.

E) 5.32ab In Dr. F's math course the correlation between the students' pre-final scores and the final exam score was $r = 0.6$. The pre-final totals have mean 280 and standard deviation 30. The final exam scores have mean 75 and standard deviation 8.

a) Find the slope and intercept of the least squares regression line of final exam scores on pre-final totals (want to predict final exam score).

b) Predict the final exam score of a student with pre-final total of 300.

Comment: See p. 130 for formulas. See ex. 5.5 on p. 136 for prediction. Answer to b) should be near 78.

F) A study of elementary school children, ages 6 to 11, finds a high positive correlation between heights x and reading score y . What explains this correlation?

comment: What is the lurking variable? See p. 142-145.

G) The SIU admissions office attempts to predict Freshman GPA from the applicant's ACT score. What are the explanatory variable and the response variable?

comment: predict the response variable using the explanatory variable

H) Minitab problem: Go to the computer lab. Get the data set prof.mtw. Assign the response variable to be "instrucr" (rating) and the explanatory variable (predictor) to be "manner". Run a regression on these variables. From the computer output, write the regression equation. Predict "instrucr" if manner = 2.47.

See the handout for using Minitab. Include the Minitab output and answer problem H) right below the output.