

MAT 223, Discussion Questions 9.18

1. Is the price of an airline ticket related to the number of miles traveled? The mileage between Washington, DC and some selected cities is given below along with the average price of an airline ticket from Washington to that city:

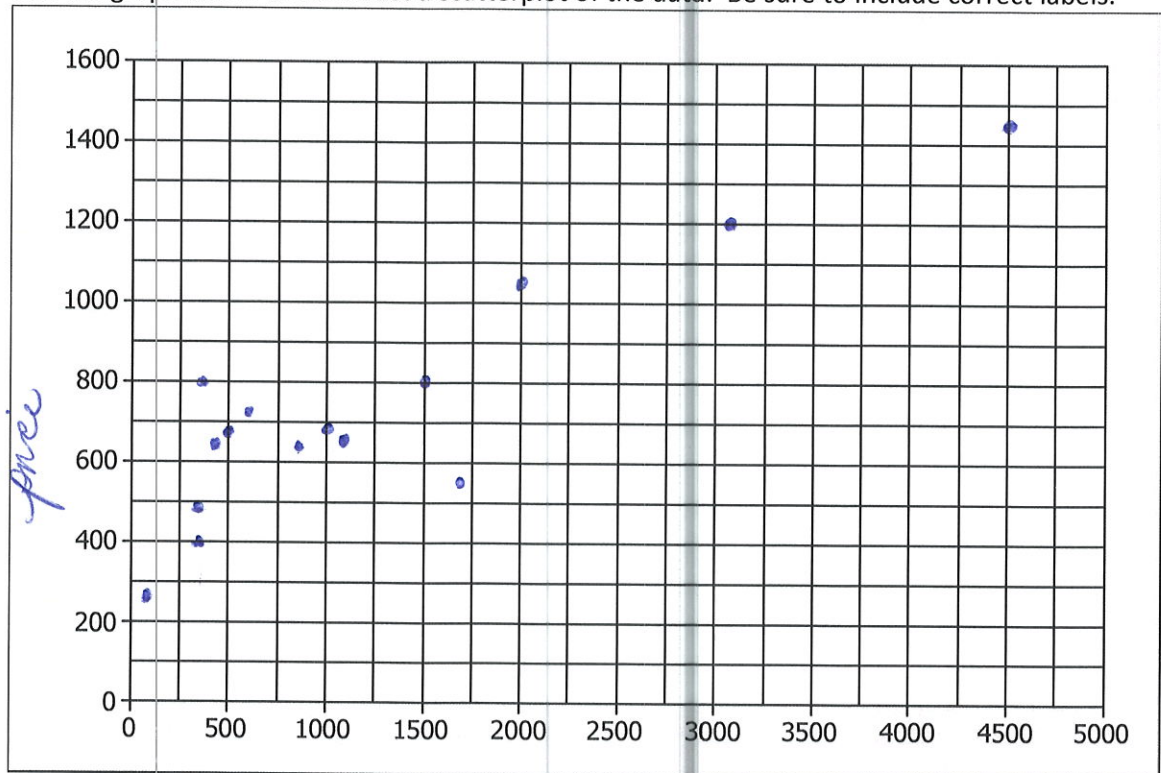
Mileage	4500	1000	2000	300	350	500	600	850
Price	1450	690	1050	400	800	670	725	620

Mileage	1700	330	1500	450	100	3100	1100
Price	550	480	800	650	250	1200	650

- a. What is the explanatory variable? What is the response variable?

explanatory variable is mileage; response variable is price

- b. Use the graph below to construct a scatterplot of the data. Be sure to include correct labels.



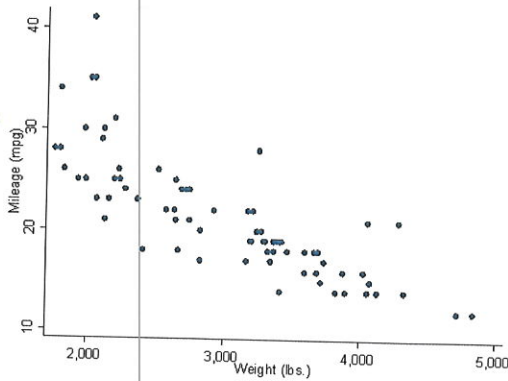
mileage

2. What is the relationship between slope and correlation?

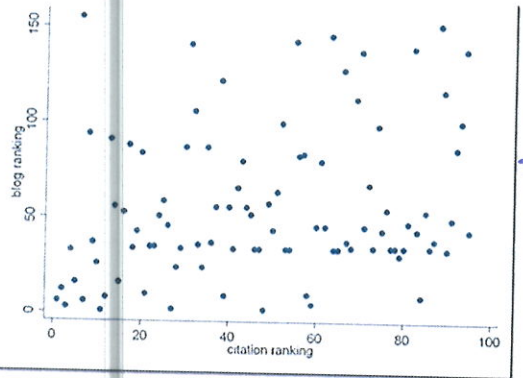
They have the same sign

3. Determine if the following graphs are displaying a linear relationship between the variables. Is the correlation positive, negative or zero?

~ linear negative



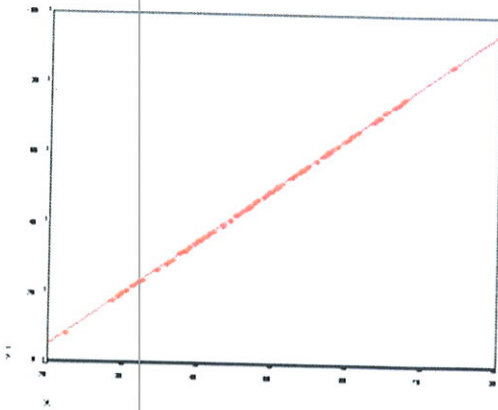
a.



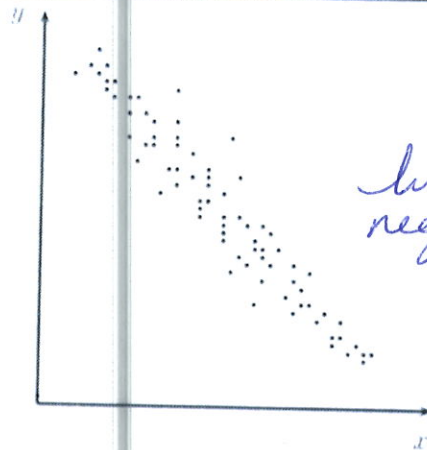
zero

d.

linear positive



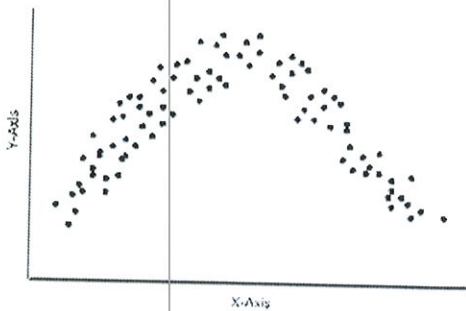
b.



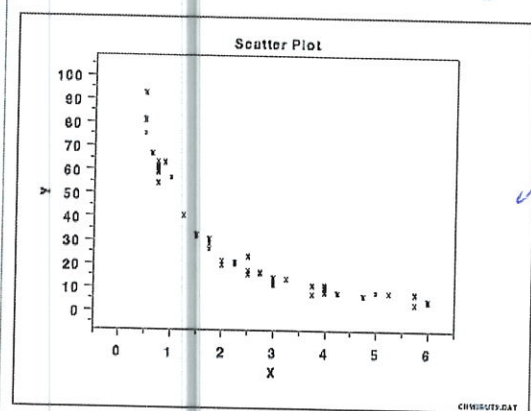
linear negative

e.

non-linear zero



c.



nonlinear negative

f.

4. What is the range of values the correlation can take?

$$-1 \leq r \leq 1$$

5. What is the coefficient of determination? What does it mean, and how is it related to the correlation coefficient?

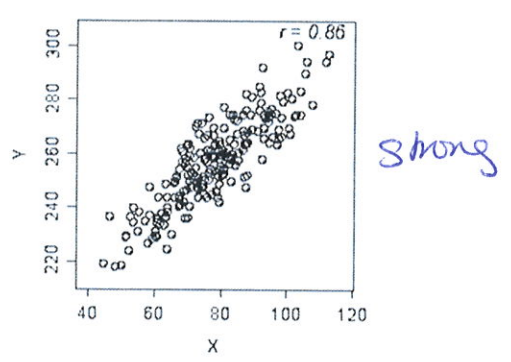
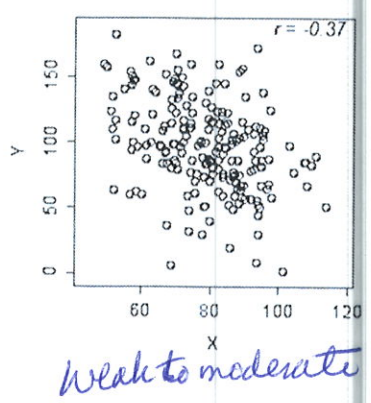
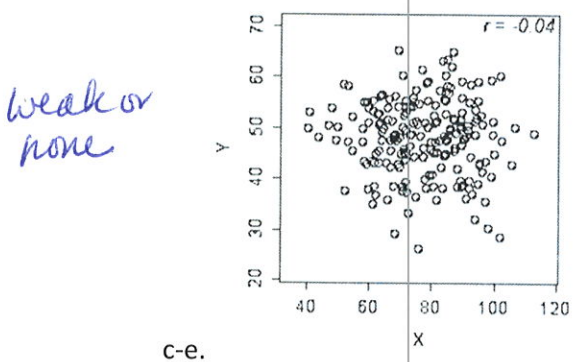
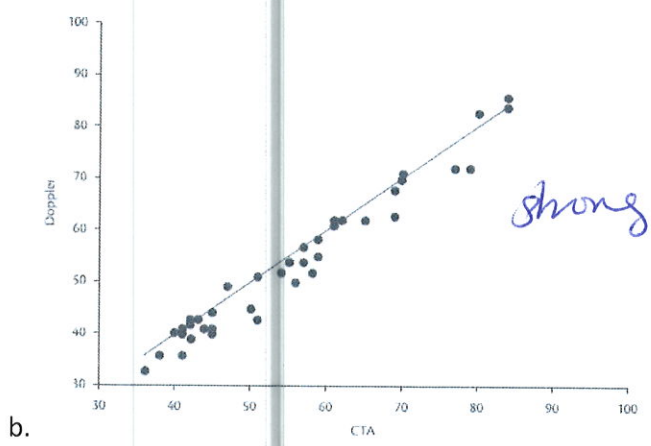
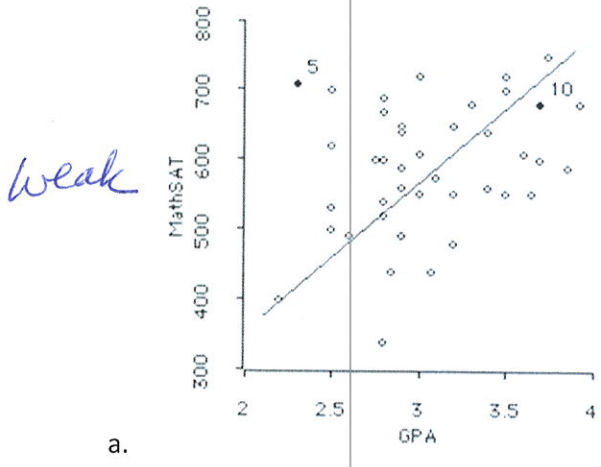
r^2 ~ the proportion of the change in y that can be explained by changes in x

6. Why does correlation not imply causation? Give an example of confounding to illustrate your point.

Things can be related coincidentally or through another variable

e.g. both ice cream sales & crime rates go up in July, but both are caused by the higher temperatures, ice cream doesn't cause crime sprees (or vice versa).

7. Which of the following graphs show a strong correlation? A moderate correlation? A weak correlation? No correlation?



8. Read the article here <https://statswithcats.wordpress.com/2015/01/01/how-to-tell-if-correlation-implies-causation/>.

