MAT 135, Discussion Questions 2.12

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:

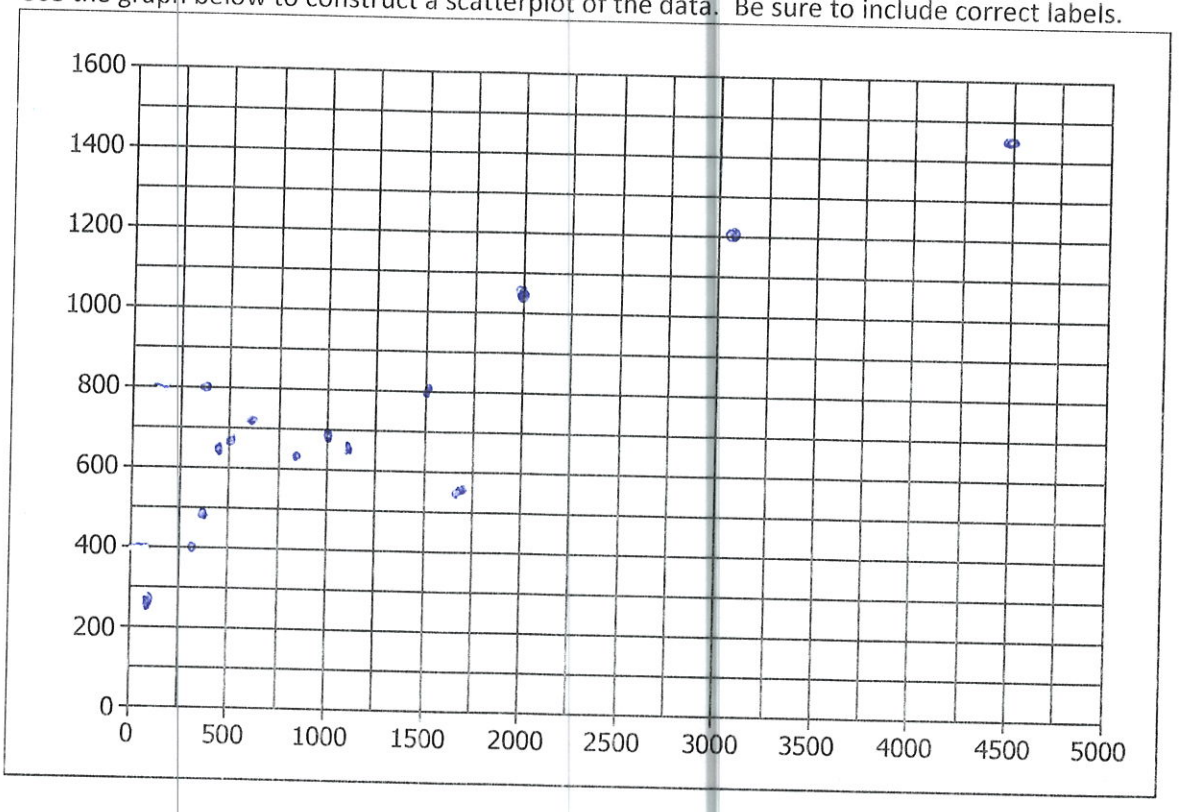
Mileage	4500	1000	2000	300	350	500	600	850
Price	1450	690	1050	400	800	670	725	620

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?

mileage price

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



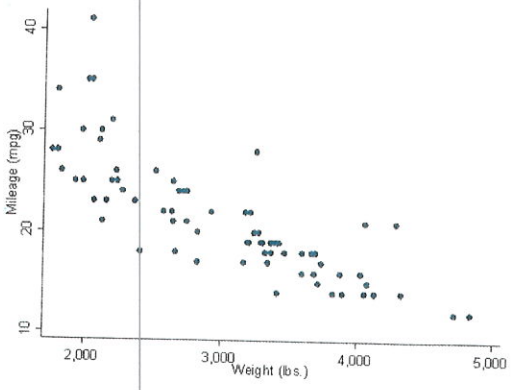
2. What is the relationship between slope and correlation?

They share the same sign
positive correlation ⟺ positive slope
negative correlation ⟺ negative slope

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

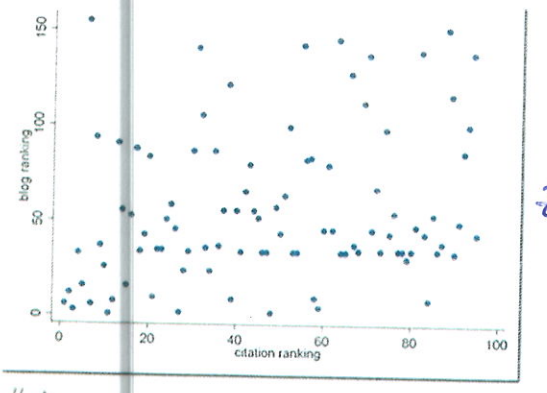
Negative

a.



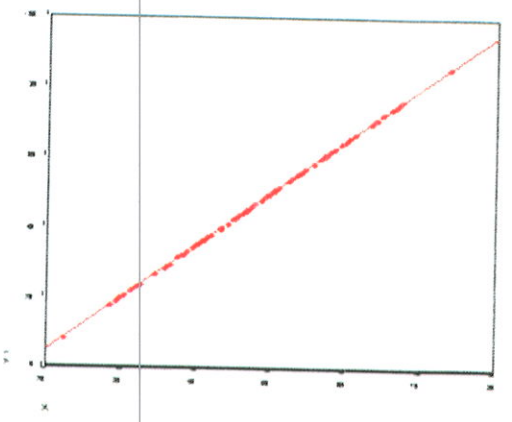
Zero

d.



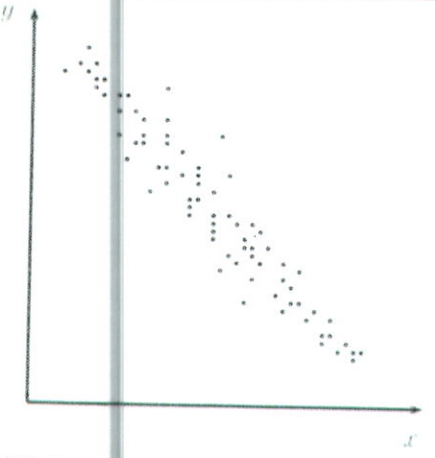
positive

b.



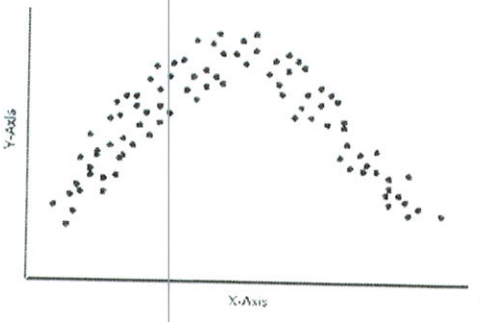
negative

e.



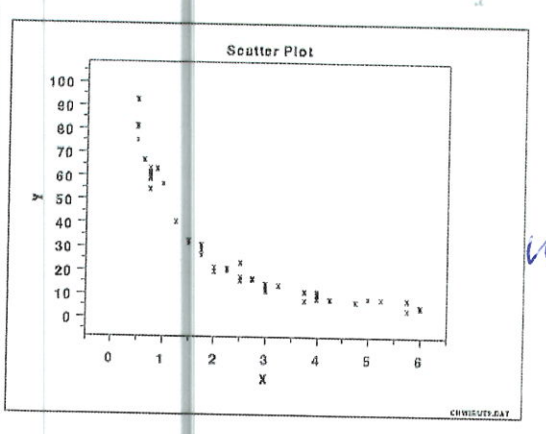
Zero

c.



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

proportion of change in y explained by relationship to x

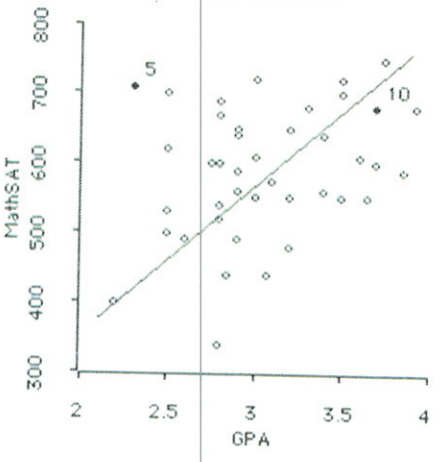
6. Why does correlation not imply causation? Give an example of confounding to illustrate your point.

too small a data set, coincidence, may be related by a third variable

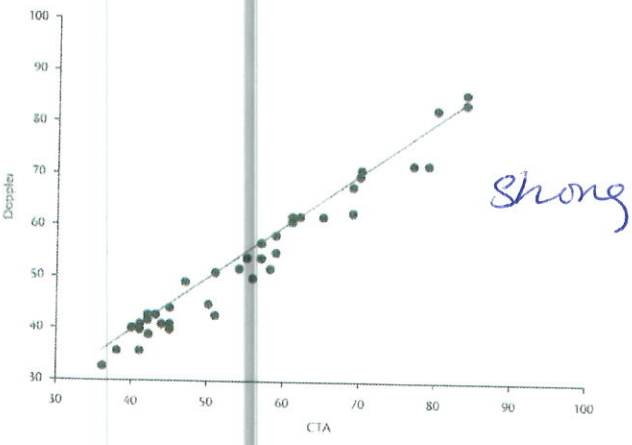
ice cream sales & crime both increase in hot weather but while ice cream sales & crime are correlated, ice cream does not cause crime

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

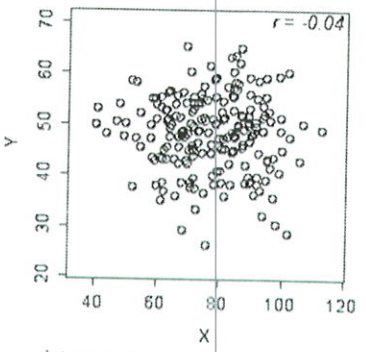
weak



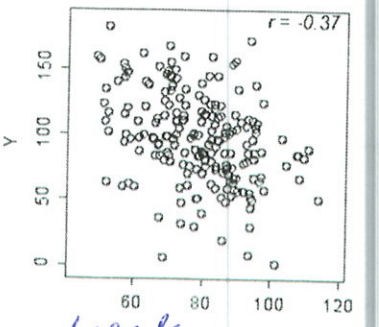
a.



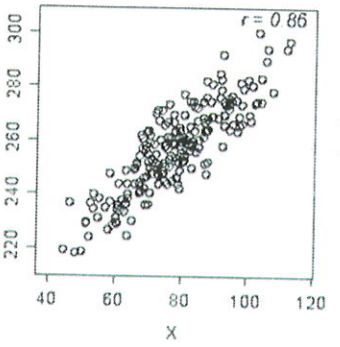
b. strong



c-e. none

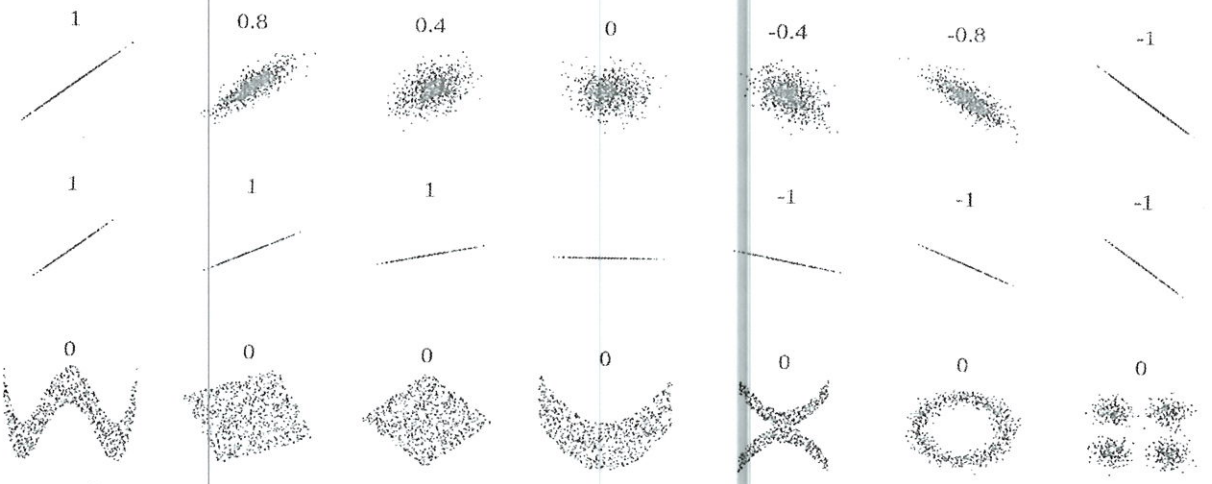


weak or weak-moderate



strong

8. Read the article here https://statswithcats.wordpress.com/2015/01/01/how-to-tell-if-correlation-implies-causation/. Be prepared to talk about it.


1
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0.4
0
-0.4
-0.8
-1
1
1
1
-1
-1
-1
0
0
0
0
0
0
0