Linear Regression Exercises · Due Wednesday October 1

The following are tables of data to be used for linear regression exercises. For each of the following tables, treat the left-hand column as the independent variable (input) and the right-hand column as the dependent variable (output), and answer each of the following questions, along with any additional questions related to the actual problem. And remember, when you turn in the homework, don't forget to STAPLE IT!

(a) Calculate the linear regression line for the data

(b) What is the slope? What is the y-intercept? Provide the units of each.

(c) What is the r value? What is the r^2 value? Is there a positive or negative correlation?

(d) Give a practical interpretation of what the slope and the y-intercept mean in the context of the problem. Give a separate interpretation for each, and be sure to write in complete, gramatically correct sentences.

DATA

1. The following example describes the expenditure (in dollars) on recreation per month by employees at a certain company, and their corresponding monthly incomes.

Expenditure ($)	Income ($)
2400	41200
2650	50100
2350	52000
4950	66000
3100	44500
2500	37700
5106	73500
3100	37500
2900	56700
1750	35600

Using the equation for the linear regression that you calculated, estimate the monthly income of an employee at this company who spends 5000 dollars per month on recreation. Is this interpolation or extrapolation?

2. The following table reports the distance (in miles) from Baltimore to each of the 12 cities along with the corresponding airfare.

Destination	Distance	Airfare
Atlanta	576	178
Boston	370	138
Chicago	612	94
Dallas	1216	278
Detroit	409	158
Denver	1502	258
Miami	946	198
New Orleans	998	188
New York	189	98
Orlando	787	179
Pittsburgh	210	138
St. Louis	737	98

3. Consider a copany that markets and repairs small computers. The following table illustrates the relationship between the length of a service call, in minutes, and the number of electronic components in the computer that must be repaired or replaced.

Length of Service Call	Number of Components
23	1
29	2
49	3
64	4
74	4
87	5
96	6
97	6
109	7
119	8
149	9
145	9
154	10
166	10

Answer the following questions about the above data in addition to (a)-(d):

(e) Using the linear regression model, estimate the number of components that need to be repaired, if a customer spends an hour on the phone for a service call (round to the nearest whole number). Is this interpolation or extrapolation?

(f) Suppose that a certain customer has an issue that requires 12 components to be fixed. How long does your regression model suggest that the customer will have to spend on the phone during a service call addressing this issue? Is this interpolation or extrapolation?