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Regression and Correlation Assignment

**I. Simple Regression**   
  
• Age   
• Dollar amount person is expected to charge   
  
**Step 1: Hypothesis**  
  
  
H0: β1 = 0

H1: β1 ≠ 0

**Step 2:** Two-Tailed Test

**Step 3:** Decision Rule

If p-value < .05; Then Reject H0

If p-value > .05; Then Do Not Reject H0**Step 4:** Calculation

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**Step 5:** Conclusion

.001 <.05 So, Reject H0

For one unit change in age there is a 17.217 increase in the amount a person is expected to charge on a credit card.  
  
**Apply decision rule to draw a conclusion and how you could use this conclusion as a marketing manager.** As a marketing manager we can use the data from the coefficients to create our formula. We can use an age range or age number to predict the amount charged on credit card for a person’s age. For example: If we wanted to test for people age range between 18-100, we could predict the amount charged for people aged 30 years old.



=1436.690 +17.217X1=1436.690 +17.217(30)  
=1953.2  
  
This says a person at 30 years old is predicted to be charged $1,953.20 on a credit card.**What other statistical analysis could you conduct that would add insight to this analysis?**We could predict if the persons annual income has a positive relationship with the amount charged on the card. The higher the income may tell us that individuals will spend more.

**II. Multiple Regression**   
  
• Age, Income, Home Value   
• Dollar amount person is expected to charge

**Step 1:** Hypotheses  
  
H0: β1 = β2 = β3 = 0

H1: Not all the βi (i=1,2,3) are 0

**Step 2:** F-test of overall linear model

Significance =α=.05

**Step 3:** Decision Rule

If p-value < .05 → Reject H0

There is a linear relationship; then evaluate individual coefficients

If p-value > .05 → Do not reject H0

There is no linear relationship; construct a new model

**Step 4: Calculation**  
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 **Step 5: Draw Conclusion**  
.001 <. 05 → Reject H0There is a linear relationship; then evaluate individual coefficients

**Step 1: Formulate Hypotheses**  
  
 (1) H0: β1 = 0

H1: β1 ≠ 0

(2) H0: β2 = 0

H1: β2 ≠ 0

(3) H0: β3 = 0

H1: β3 ≠ 0

**Step 2: Two-Tailed Test for each coefficient**  
Significance =α=.05

**Step 3: Decision Rule**

If p-value < .05 ; Reject H0

If p-value > .05; Do not reject H0

**Step 4: Check significance and coefficients**

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**Step 5: Apply Decision Rule and Draw Conclusion**

If p-value < .05 ; Reject H0

If p-value > .05; Do not reject H0

**For β1 Hypothesis:**  
.001 < .05 ; Reject H0-For one unit change in age there is a 12.695 increase in the amount a person is predicted to charge on a credit card.

-The coefficient is statistically significance at 1% alpha level  
  
**Step 5: Apply Decision Rule and Draw Conclusion**

If p-value < .05 ; Reject H0

If p-value > .05; Do not reject H0

**For β2 Hypothesis:**  
.001 < .05 ; Reject H0-For one unit change in value of a person’s home there is a 1.429 increase in the amount a person is predicted to charge on a credit card.  
-The coefficient is statistically significance at 1% alpha level  
  
**Step 5: Apply Decision Rule and Draw Conclusion**

If p-value < .05 ; Reject H0

If p-value > .05; Do not reject H0

**For β3 Hypothesis:**  
.001 < .05 ; Reject H0-For one unit change in a person’s annual income there is a 12.072 increase in the amount a person is predicted to charge on a credit card.  
-The coefficient is statistically significance at 1% alpha level  
  
**Apply decision rule to draw a conclusion and how you could use this conclusion as a marketing manager.**   
As a marketing manager we could apply the linear model and use it for predicting. We could test the age, annual income, and value of a person’s home.

If a person’s age range is 18-79  
Household income: 50-500   
Home Value: 1000-3000  
We can make the prediction: What is the amount charged on credit card for a person 30 years old with a household income of 150 and a home value of 2000?

=191.245+12.695X1+1.429X2+12.072X3=191.245+12.695(30)+1.429(2000)+12.072(150)  
=191.245+380.85+2858+1810.80  
=5,240.90  
We can conclude that a 30 year old with a $150K annual income who owns a $2M property is predicted to be charged $5,240.90 on their credit card.

**What other statistical analysis could you conduct that would add insight to this analysis?**We can also predict the number of items purchased on primary card or amount spent on the primary has a positive relationship to the amount charged on the credit card. Predicting an individual’s purchase behavior, we can see what the expected amount an individual is likely to spend a month or year. We could also predict whether household sizes have a positive relationship to the amount spent on the credit card. This could help us see if larger families have a need to spend more on the credit card.