Lesson Plan 8.1: Correlation Between Apartment Square Footage and Cost Using Linear Regression Analysis

Text: Financial Algebra Southwestern, Cengage Learning, 2011
Chapter 8: Independent Living Unit 1: Affording the Rent
Title of unit: Finding a Place to Live- SF/Cost Linear Regression Analysis
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Students will expand upon the learning in 8.1 on regression analysis to determine the correlation between square footage, and the amount charged for rent. They will find the linear regression equation, and determine the correlation coefficient, using graphing calculators. Then they will perform the same functions using data collected from their own communities, and analyze the results.
Location: Classroom with 4 student computers

TEACHER: Teacher Prep/ Lesson Plan

- **Lesson Objectives:** Students will be able to determine the relationship between square footage and monthly rent using linear regression analysis.

- **List of prerequisite skills needed:** Familiarity with regression analysis (chapter 2)

- **Vocabulary:** square footage; correlation, amenities, and linear regression analysis

- **State Standards addressed:**
  Math: **A1.6D** Find linear function of bivariate data**,** determine slope and Y intercept of line, make predictions
  A1.6 E Describe the correlation of scatter plots as strong or weak, positive or negative
  CSS: Model w/ Math – Everyday Life
  Use Appropriate Tools-Analyze graphs using a graphing calculator

  Leadership: DECA connection: Working cooperatively to solve a problem

- **Teacher Preparation:** *Text, computer access, and graphing calculator*

Content Delivery

Step 1. Review the objectives and vocabulary 5 minutes
Step 2. Read Example 2 on page 387 5 minutes

Lab Steps 3-6
Step 3. Ask Students: Will the hypothesis about square footage of apartments correlating to price hold true for Seattle, or will variations in neighborhood amenities and views mean that other variables are more of a determinant?
Step 5. In teams, look up 3 properties each with the following criteria to 10 minutes isolate variables: 1 bedroom, unfurnished, within Seattle. Record the square footage, the price, the neighborhood, and rate comments on the view. Each team will use a different website. Paste the resulting links to the document on the server to share with the class for ranking.

Step 6. Using the overhead projector, have students rank the neighborhoods and views of the apartments that the found. Record the data on the data collection sheet pulled by the instructor from the server.

Apartment websites:
http://www.seattlerentals.com/
http://www.forrent.com/search-apartments-by-area/WA/Greater-Seattle.php
www.forrent.com/**Seattle**
www.**apartmentsearch**.com/

Step 7. Graphing
Have students clear their graphing calculators, to avoid errors or shortcuts caused by the last class to use them.
Refer them to the class poster for instructions:
$2^{nd,}$ Quit (mode), 2^{nd} +,
2^{nd} Option 7 (Reset), clear

Step 8. Have students enter the data from the text
-STAT, option 1–edit, enter data on sf in L1, and rent in L2
-STAT, Tab calculate 2 variable stats, Enter
-Point out that .9615 means over 90% correlation between sf and price.
-.7 or high suggests a strong correlation
- (Δ in dependent variable brings an = Δ in dependent variable)

Step 9. Have students view how that looks on the graph Graph:
Zoom Tab

Step 10. Have students substitute data from their lab research and repeat calculation enter the data into L3 & L4
How close is the correlation between sf and rent?
How does that compare to the community used in the book?
Have students repeat graphing formula for a visual.
How do the two graphs differ?
What real world variables account for the difference?

- **Instructional Documents:** Data Collection Sheet
- **Assessment Tool used in this Lesson:** See accompanying quiz
- **Reinforcement/Intervention/Extension Activities:** Group exercise adaption –
  Break into 4 teams: Team 1 does apartments in neighborhood #1
  Team 2 Apartments in neighborhood #2 Team 3 Condominiums
  Team 4 Single-family homes.

  Data Sheet can be used to determine mean, median, and average prices as a possible extra credit or further learning assignment.

- **Career Applications** *(When will this be used in "real life"?)*
  List of applicable careers: Real Estate market analysis, Construction, Urban Planning. Can be adapted for homes sold and square footage to determine supply and demand applications.

	A	B	C	D	E	F	G
1		**8.1 Data Collection Sheet**			**Linear Regression Alalysis**		
2		independent	dependent	**Rate 1-12**	**Rate 1-12**		
3		variable	Variable	Lowest -Highest	L-H	Feature	
4		**Square Feet**	**Monthly Rent**	**Neighborhood**	**Rate View**		
5	1						
6	2						
7	3						
8	4						
9	5						
10	6						
11	7						
12	8						
13	9						
14	10						
15	11						
16	12						
17							
18		What was the correlation in the book sample? _____					
19		What was the correlation in the class sample? _____					
20							
21		Why might each sample be imperfect? _____					
22		_____					
23							
24		**Extra Point**					
25		What correlation did you find between high ranking of the neighborhood and rent?					
26		What correlation did you find between high ranking of the view and rent?					

Quiz

Using Linear Regression Analysis
To Find True Value In An Apartment

1. If there is a strong correlation efficient between an apartment amenity, such as having a garage to park your car, and the price of the apartment, you should expect the answer to be:
   a. closer to 1 (.70 or above) . b. further away from 1 (.70 or below). c. > 1 d. 0.

2. If an incremental increases in an amenity causes the price to rise significantly, you can expect the slope of the line graph formed by the scatter plot to be a) more vertical. b) more horizontal. c) have no pattern. d. have intersecting lines. e) be unpredictable.

3. In order to establish a correlation efficient, variables must: a**) have a numeric value.**
   b) be written in English. c) have similar numbers. d) be in more than two lists.

4. An amenity is a) a nice view b) nearby parks c) local shops d) a garage **e) a, b, c, & d**

5. In order to determine weather an amenity has a strong effect on the price of an dwelling, it is important to a) make all prices the same **b) eliminate variables that might confuse the results c) add irrelevant variables** d) add a little extra to the price e) use more than 2 variables

In order to establish a correlation efficient, variables must: a) have a mathematical value.
b) be written in English. c) have similar numbers. d) be in more than 2 list.