You will consider and discuss the relationship between data from three sets of lists. Then you will plot the data with the help of the program **CORLATE**. For each set you will create a scatter plot, and then you will use the Home screen to explore the data and answer questions.
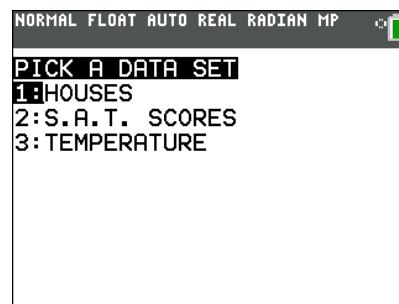
Problem 1 – Home Price vs. Square Footage

Discuss this first question with a partner and record your thoughts before looking at the data.

1. How do you think the selling price of a house relates to the amount of area of the house or square footage? Do you think there is any correlation? What are the variables? Which variable is the independent variable? Which variable is the dependent variable? What else might the price of a house depend upon?

Now run the program **CORLATE** and select option 1, **HOUSES**. The area measured in square feet of a house is in **L1**. The selling price of the corresponding house (given in hundreds of dollars) is in **L2**. Once the data is graphed, consider if you still agree with your initial predictions.

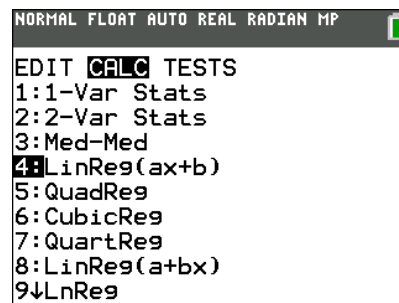2. Explain the meaning of the point (2650,2050). Include units.

```
NORMAL FLOAT AUTO REAL RADIAN MP

PICK A DATA SET
1:HOUSES
2:S.A.T. SCORES
3:TEMPERATURE
```

3. Choose the type of correlation (circle your answer).

    a. positive   negative

    b. very strong   moderately strong   moderately weak   very weak

4. Predict the value of the correlation coefficient to one or two decimals. Explain your reasoning.

On the Home screen, calculate the linear regression equation. Press STAT, move the cursor to the CALC menu, and select **LinReg(ax+b)**. Then, enter the list of your independent variable, the list of your dependent variable, and store the regression equation in **Y1** using ALPHA [F4].

```
NORMAL FLOAT AUTO REAL RADIAN MP

EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7:QuartReg
8:LinReg(a+bx)
9↓LnReg
```

5. What is the regression equation?

6. What is the correlation coefficient, *r*? How does the coefficient compare with your description of the correlation? How does your prediction compare?

Press ⌊GRAPH⌋ to return to the scatter plot. The regression equation will be graphed with the plot.

Press ⌊TRACE⌋, and then use the down arrow ⌊▾⌋ to view the equation in the top-left corner.

7. What is the sign of the slope? How does this relate to the sign of the correlation coefficient? What is the meaning of the slope in the context of the data? Also explain the *y*-intercept in the context of the data.

Use the regression equation or the table feature to determine the following predictions.

8. Predict the price of a house that has 3,500 sq. ft.

9. Predict the number of square feet for a house costing $150,000.

10. Predict the price of a house with 50,000 sq. ft. Does this prediction seem reasonable based on the data given? Explain.

11. Predict the number of square feet for a house costing $5.2 million. Does this prediction seem reasonable based on the given data? Explain.

Problem 2 – S.A.T. Verbal and Math Scores

Discuss the next question before looking at the data. You will be analyzing Math and Verbal scores from male and female students who took the SAT exam.

12. Do you think students who score well on the Verbal section of the SAT exam also score well on the Math section? Discuss and record your thoughts on which variable is the independent and dependent variable. Do you think there will be a correlation?

Run the program **CORLATE** and select option 2, **S.A.T. SCORES**. The Verbal scores for a sample of 162 students are located in **L1**. The Math scores for those students are in **L2**.

13. Choose the type of correlation (circle your answer).

    a. positive   negative

    b. Do you think the correlation is stronger, weaker, or about the same as the data set from Problem 1?

Find the linear regression equation.

14. Record the regression equation and explain the meaning of the slope.

15. What is the correlation coefficient? How does your prediction compare?

Return to the scatter plot to view the regression equation. Use the regression equation to determine the following predictions.

16. Predict the Math score if the Verbal score is 500.

17. Predict the Verbal score if the Math score is 620.

18. Is there a relationship between these two variables? Is one dependent on the other? Is there correlation and/or causation?

Problem 3 – Latitudes vs. Temperatures in January

In this problem, you will investigate the temperature of locations at various latitudes on Earth in the month of January.

19. Do you think the latitude of a location is related to the temperature at that location? Discuss and record you thoughts. What is the independent and dependent variable? What are other variables that affect the temperature of a location?

20. Predict the type of correlation (circle your answer).

    a. positive   negative

    b. very strong   moderately strong   moderately weak   very weak

Run the program **CORLATE** and select option 3, **TEMPERATURE**. The latitude (in degrees north of the equator) of 50 different locations is displayed in **L1**. The average minimum January temperature in °F for the 50 locations is in **L2**.

21. Predict the value of the correlation coefficient. Explain your reasoning.

Find the linear regression equation and store the equation in Y_1.

22. Record the equation and explain the meaning of the slope and *y*-intercept.

23. What is the correlation coefficient? How does your prediction compare? How does it compare with your description of the correlation?

Use the regression equation to determine the following predictions:

24. Predict the average minimum January temperature for a city with latitude 28.3 degrees North.

25. Predict the latitude for a city with an average minimum January temperature of 46°.

Now discuss and investigate what would happen if the temperatures were changed from Fahrenheit to Celsius.

26. If you know that 0 ºC is 32 ºF and 100 ºC is 212 ºF, what is the formula for the temperature in degrees Celsius as a function of the temperature in degrees Fahrenheit? Create a third list that converts the temperatures to Celsius by entering the formula in the top of **L3**.

27. Use 2nd Y= to add another [STAT PLOT] and find the new regression equation. Record the equation and correlation coefficient.

28. Describe what happened to the plot of Celsius vs. Latitude compared to the Fahrenheit vs. Latitude. Explain.