PROBLEM-SOLVING EXERCISE #3
ESTIMATING AND PREDICTING UNKNOWNS

In this exercise you will use least-squares curve fitting to develop two equations to model the data given. Using these equations, we will predict the function values for two inputs and evaluate the prediction made by each of the curves and linear interpolation.

PART A

X	16	21	26	31	36	41	46	51	56	61
Y	32	40	46	48	53	52	54	57	59	61

Using the **8 non-shaded values** above, find a_0 and a_1 for the least squares linear regression. We will save the shaded values for our test data, that is, data points that are known but we will not include in the information used to make a representative curve. We will use these points to see how close our curve fit is to predicting actual values that were not used to derive the curve. Compute the overall squared-error. Write the completed polynomial.

PART B

Using the **8 non-shaded values** from part A, find a_0, a_1, and a_2 for a parabolic least squares regression (polynomial of degree 2). Use MS Excel to solve for these coefficients. Compute the overall squared-error. Write the completed polynomial. *Include a printout of your Excel spreadsheet.*

PART C

On two separate graphs, plot the non-shaded data points and show the resulting curves from Part A and Part B; a separate graph for each curve. Use graph paper.

PART D

Fill in the following test table:

	Y values			Absolute Error: |Actual-Predicted|			Results		
X	linear interpolation	linear fit	parabolic fit	linear interpolation	linear fit	parabolic fit	actual	best value	best method
31							48		
51							57		

Which method(s) performed the best? Would you have expected the outcomes? How do these perform for these data points vs. the linear and parabolic curve's squared errors? Discuss your answer.

PART E

In Part B you used Microsoft Excel to solve for the coefficients for parabolic least squares regression (polynomial of degree 2). Using **Visual Basic** to automate Microsoft Excel, create this Excel Spreadsheet. You will learn about this during the second week in problem-solving. Turn in a printout (screen shot) of this program.

PROBLEM SOLVING DELIVERABLES

You should work in teams of either two or three. You may not work alone. Turn in your results for Parts A, B, C and D and your team's signed cover page at the beginning of your team's lecture on Wednesday, October 26, 2022 for Professor Siadat's lecture or Thursday, October 27, 2022 for Professor Hanna's lecture. One set of results should be submitted per team.