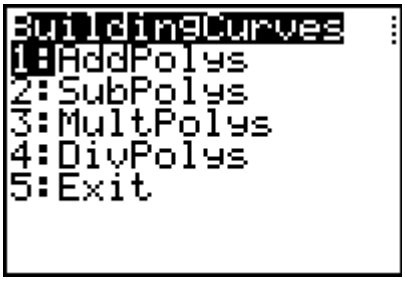
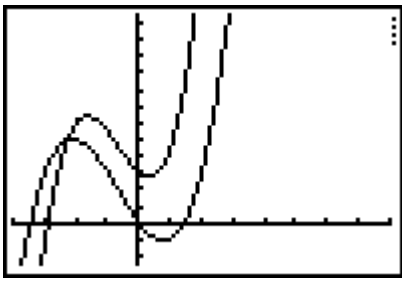
Problem 1 – Adding Polynomials

In this problem, you will build the graph of $(f+g)(x)$ from the graphs of $f(x)$ and $g(x)$. Run the **BLDCURVE** program and choose **1:AddPolys.**

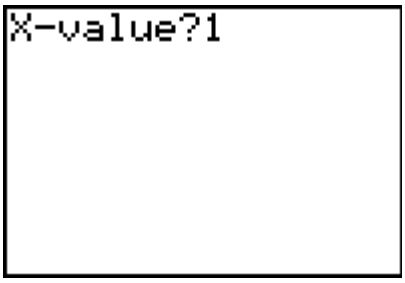


Listen as your teacher explains what $(f + g)(x)$ means. Look at the graphs of $f(x)$ and $g(x)$. Make hypotheses about what the graph of $(f + g)(x)$ will look like.



In the graph of $(f + g)(x)$, each y-value is found by adding $f(x)$ and $g(x)$.

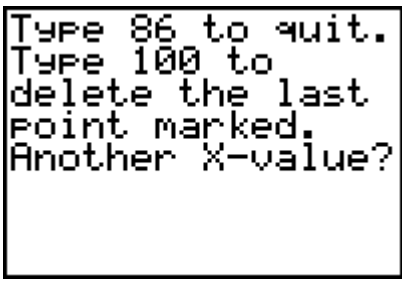
Press [ENTER]. The program prompts you to enter a value for x. Enter **1**. The program draws a vertical line at $x = 1$ and displays the values of $f(1)$ and $g(1)$.



Use the left and right arrows to move the cursor along the vertical line $x = 1$ until the y-value (shown at the bottom of the screen) is equal to $f(1) + g(1)$. The cursor is now on a point that is on the graph of $(f + g)(x)$.

Press [ENTER] to mark this point.

Press [ENTER] again and the system will prompt you for another x-value.



Continue plotting points on the graph of $(f + g)(x)$ until you have plotted at least 10 points. Plot the points to the nearest tenth.

Note: If you plot a point that is not on the graph or enter an x-value for which you cannot plot a point because the y-value is too large or too small, enter **100** as an x-value and the program will delete the last point you plotted.

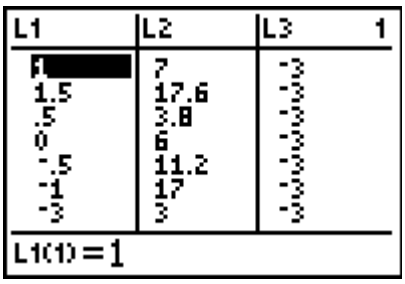
When you have plotted 10 points, look at the shape of the graph and answer the following:

- When is the graph of $(f + g)(x)$ above the graphs of $f(x)$ and $g(x)$?

- When is it between the graphs of $f(x)$ and $g(x)$? When is it below?

Then enter **86** to return to the menu and choose **Exit**.

View **L1** and **L2** in the **List Editor** and confirm that you captured 10 data points.



Perform a cubic regression to find an equation through the points you plotted, storing the equation in **Y3**.

- Record the regression equation.

- The degree of $f(x)$ is 3 and the degree of $g(x)$ is 3. What is the degree of $(f + g)(x)$?

Press GRAPH to view the regression model.

$f(x) = x^3 + 2x^2 – 5x$

$g(x) = 2x^3 + 4x^2 – 3x + 6$.

- Calculate $(f + g)(x)$ algebraically.

- How does this result compare with the regression equation?

Problem 2 – Subtracting Polynomials

In this problem, you will use the same steps to build the curve $(f – g)(x)$. Run **BLDCURVE** and select **2:SubPolys**. After you have plotted 10 points, answer the following:

- When is the graph of $(f – g)(x)$ above the graphs of $f(x)$ and $g(x)$?

- When is it between the graphs of $f(x)$ and $g(x)$?

- The degree of $f(x)$ is 4, and the degree of $g(x)$ is 4. What is the degree of $(f - g)(x)$?

- Based on your answer, choose and perform a polynomial regression on the data in **L1** and **L2**. Record the regression equation.

$f(x) = x^4 + 3x^3 - 2x^2 + 6x + 1$

$g(x) = -x^4 + 3x^2 - 4x + 3$

- Calculate $(f - g)(x)$ algebraically.

- How does this result compare with the regression equation?

Problem 3 – Multiplying Polynomials

Run the program **BLDCURVE** and select **3:MultPolys**. Build the curve of $(f * g)(x)$.

- The degree of $f(x)$ is 2 and the degree of $g(x)$ is 2. What is the degree of $(f * g)(x)$?

Use the appropriate statistical regression to find an equation for the curve you built.

$f(x) = x^2 + 4$

$g(x) = -2x^2 + 3x + 5$

- Calculate $(f * g)(x)$ algebraically.

- How does this result compare with the regression equation?

Problem 4 – Dividing Polynomials

Run the program **BLDCURVE** and select **4:DivPolys**. Build the curve of $(f \div g)(x)$.

- The degree of $f(x)$ is 3 and the degree of $g(x)$ is 1. What is the degree of $(f \div g)(x)$?

Use the appropriate statistical regression to find an equation for the curve you built.

$f(x) = x^3 - x^2 + 3x + 5$

$g(x) = x + 1$

- Calculate $(f \div g)(x)$ algebraically.

- How does this result compare with the regression equation?