

## B-7 Making a Table of Differences

To create a table with the first and second differences for a function, use the STAT lists.

1. Press **STAT** **1** and enter the  $x$ -values into L1.

For the function  $f(x) = 3x^2 - 4x + 1$ , use  $x$ -values from  $-2$  to  $4$ .

L1		L3
-2		
-1		
0		
1		
2		
3		
4		

L2 = "3L1^2-4L1+1"

2. Enter the function.

Scroll right and up to select L2. Enter the function  $f(x)$ , using L1 as the

variable  $x$ . Press **ALPHA** **+** **3** **2nd** **1** **x<sup>2</sup>** **-** **4** **2nd** **1** **+** **1** **ALPHA** **+**.

3. Press **ENTER** to display the values of the function in L2.

L1	L2	#	L3	#
-2	21			
-1	8			
0	1			
1	0			
2	5			
3	16			
4	33			

L3(1) = -13

4. Find the first differences.

Scroll right and up to select L3. Then press **2nd** **STAT**.

Scroll right to **OPS** and press **7** to choose **ΔList(**.

Enter L2 by pressing **2nd** **2** **)**.

Press **ENTER** to see the first differences displayed in L3.

5. Find the second differences.

Scroll right and up to select L4. Repeat step 4, using L3 in place of L2. Press

**ENTER** to see the second differences displayed in L4.

L2	#	L3	#	L4	#
21		-13		6	
8		-7		6	
1		-1		6	
0		5		6	
5		11		6	
16		17			
33					

L4(1) = 6

## B-8 Finding the Zeros of a Function

To find the zeros of a function, use the **zero** operation.

1. Start by entering  $y = -(x + 3)(x - 5)$  in the equation editor, then press

**GRAPH** **ZOOM** **6**.

2. Access the zero operation.

Press **2nd** **TRACE** **2**.

CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx

- Use the left and right arrow keys to cursor along the curve to any point to the left of the zero.

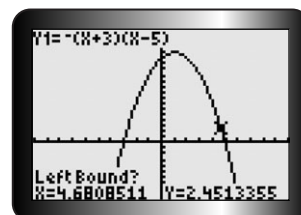
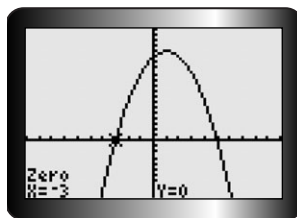
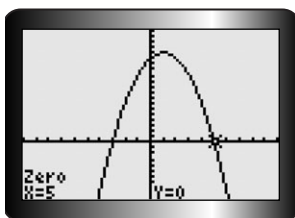
Press **ENTER** to set the left bound.

- Cursor along the curve to any point to the right of the zero.

Press **ENTER** to set the right bound.

- Press **ENTER** again to display the coordinates of the zero (the  $x$ -intercept).

- Repeat to find the second zero.



## B-9 Finding the Maximum or Minimum Values of a Function

The least or greatest value can be found using the **minimum** operation or the **maximum** operation.

- Enter  $y = -2x^2 - 12x + 30$ .

Graph it and adjust the window as shown. This graph opens downward, so it has a maximum.

- Use the **maximum** operation.

Press **2nd** **TRACE** **4**. For parabolas that open upward, press

**2nd** **TRACE** **3** to use the **minimum** operation.

- Use the left and right arrow keys to cursor along the curve to any point to the left of the maximum value.

Press **ENTER** to set the left bound.

- Cursor along the curve to any point right of the maximum value.

Press **ENTER** to set the right bound.

- Press **ENTER** again to display the coordinates of the optimal value.

