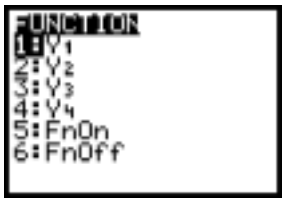
CHAPTER 7 Calculator Notes for the TI-73

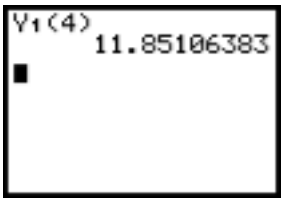
Note 7A • Function Notation

Functions are entered into the Y= screen and are referred to by name as Y1, Y2, Y3, and Y4.

To evaluate a function for a particular x-value (for example, Y1 when $x = 4$, as shown in the screen here), press 2nd [VARS], select 2:Y-Vars..., and select 1:Y1.



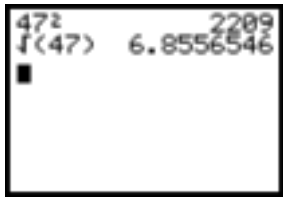
Then, press (4) ENTER.



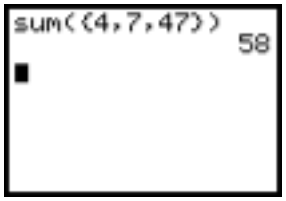
Note 7B • Some Functions

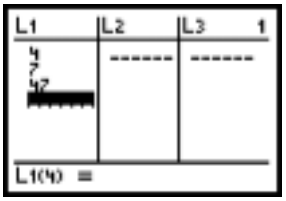
To use the command for squaring, enter a number in the Home screen and press x^2 ENTER.

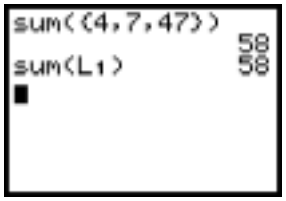
To use the command for square root, press 2nd [$\sqrt{\ }$] in the Home screen. Then, enter a number, close the parentheses, and press ENTER.



To use the command for sum of a list, press 2nd [STAT], arrow to MATH, and select 7:sum(. Then, press 2nd [CATALOG], arrow up to the left brace, {, and press ENTER. Enter the numbers of a list, separating each number with a comma. Close the braces and the parentheses, and press ENTER. (You can also access braces from the Text screen by pressing 2nd [TEXT].) Alternatively, press LIST and enter your numbers into a list, say list L1. Then enter sum(L1) in the Home screen and press ENTER.







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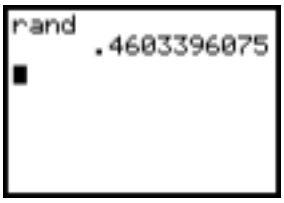
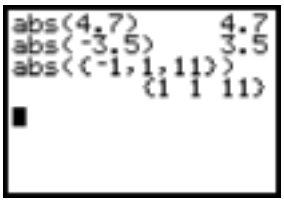
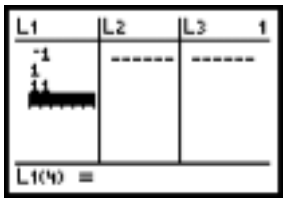
The command for a random number generates a random 10-digit decimal number between 0 and 1. Press MATH, arrow to PRB, and select 1:rand. Then, press ENTER.

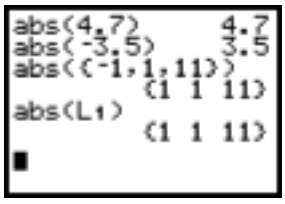


Note 7C • Absolute Value

Press MATH, arrow to NUMeric, and select 1:abs(. Then, enter a number, close the parentheses, and press ENTER.

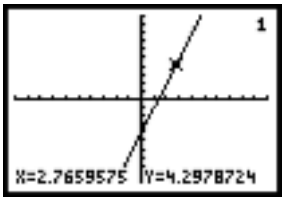


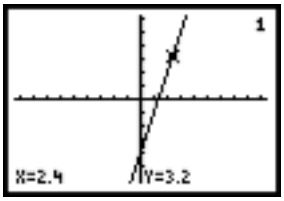




Note 7D • Friendly Windows

When you trace a function or locate a point on the screen, you often see long, "ugly" decimal values for the coordinates of your points. Sometimes, however, the values are "nice, friendly" values, like 2.4 or 4.84 or repeating decimals like 4.3333333.





When the proper values are set for Xmin and Xmax in the WINDOW screen, the coordinate values of your points are these "friendly" numbers for most functions, and the resulting graph windows are called friendly windows. This is because the calculator screen is made of tiny square dots called pixels. When you trace horizontally across the screen, the *x*-coordinate changes by one pixel with each trace step. There are a total of 94 pixels across the screen, and the value for Δx in the WINDOW screen sets the size of each trace step. For example, if you set $\Delta x = 1$, the breadth of the domain showing on the screen, Xmax−Xmin, will be 94 units. The calculator automatically puts the origin halfway between Xmin and Xmax, so it sets Xmin $= -47$ and Xmax $= 47$. If $\Delta x = 0.5$, then Xmin $= -23.5$ and Xmax $= 23.5$. Both of these settings for Xmin and Xmax create a friendly window. If, on the other hand, you set Xmin and Xmax arbitrarily, Δx is automatically set to be $\frac{\text{Xmax}-\text{Xmin}}{94}$, and it probably won't give rise to a friendly window. (*Note:* The *y*-coordinate is calculated by evaluating the function for the *x*-coordinate. So if the coefficients of a function are irrational, the *y*-coordinates will not be nice even in a friendly window.)

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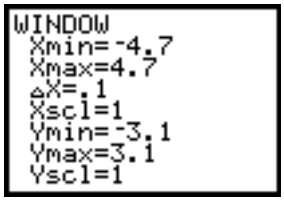
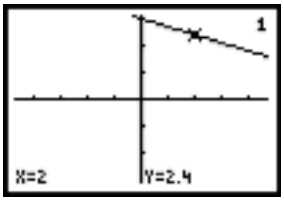
Square Windows

If Δx, the width of a pixel, equals Δy, the height of a pixel, the window is square. For example, the calculator screen is 94 pixels across and 62 pixels high. So if Xmax−Xmin = 94 and Ymax−Ymin = 62, each pixel is 1 unit wide and 1 unit high and the screen is square. In a square window, squares appear as squares, not as rectangles or parallelograms, and the line $y = x$ makes a 45° angle with both axes. A square window is often the preferred window to use because it displays no visual distortion. However, a square window showing 94 horizontal units and 62 vertical units is much too large for most applications.

Two Friendly Square Windows

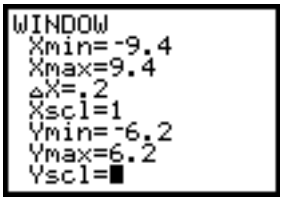
If you press ZOOM and select **8:ZDecimal**, you get a special small friendly square window with the values [−4.7, 4.7, 1, −3.1, 3.1, 1]. In this window, Δx = 0.1. (Δx is not listed in the window description.) The window is square because the horizontal and vertical units in the screen are equal in size. There are 94 horizontal pixels each with width 0.1 and 62 vertical pixels each with height 0.1. However, this window, [−4.7, 4.7, 1, −3.1, 3.1, 1], is sometimes too small to show much of the graph.

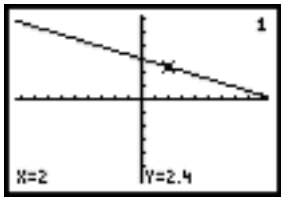




[−4.7, 4.7, 1, −3.1, 3.1, 1]

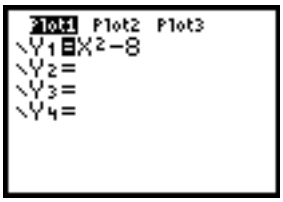
To see more of the graph in the window, you can double the Xmin, Xmax, Ymin, and Ymax values [−9.4, 9.4, 1, −6.2, 6.2, 1]. In this doubled window, Δx = 0.2. This square window is often used for problems in this course, and because it is two times the **ZDecimal** window, it is referred to as the friendly window with a factor of 2.

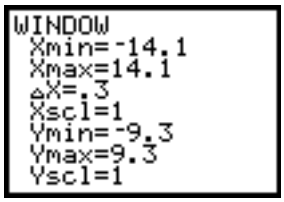


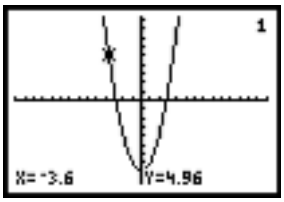


Other Friendly Square Windows

Values for origin-centered friendly square windows are [−47 · Δx, 47 · Δx, 1, −31 · Δy, 31 · Δy, 1]. For example, if Δx and Δy each equal 0.3, then . . .







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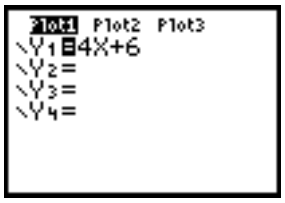
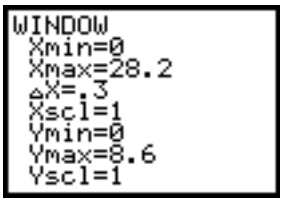
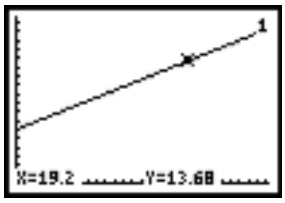
First-quadrant friendly square windows are [0, 94 • Δx, 1, 0, 62 • Δy, 1]. Again, if Δx and Δy each equal 0.3, then . . .



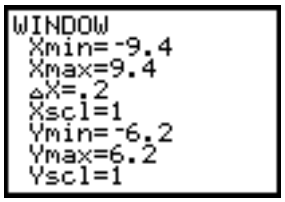


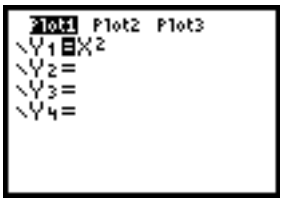


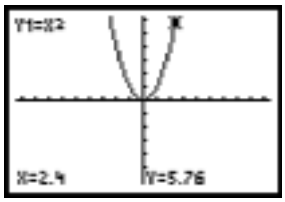
[0, 28.2, 1, 0, 18.6, 1]

Friendly Windows That Are Not Square

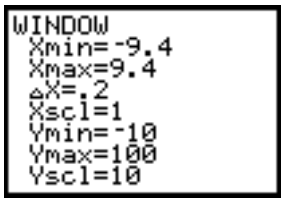
The Ymin and Ymax values of a friendly square window can be changed to show a larger or smaller range. The graph will look distorted, and it will no longer be square, but this might be necessary to see more of the graph. For example, the graph of $y = x^2$ in the friendly square window [−9.4, 9.4, 1, −6.2, 6.2, 1] runs off the top of the graph for x-coordinates greater than 2.4. If you want to see more of the graph, change the window to [−9.4, 9.4, 1, −10, 100, 10]. This is a friendly window because the coordinates are still nice, but it is not square.

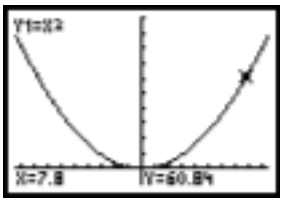






[−9.4, 9.4, 1, −6.2, 6.2, 1]





[−9.4, 9.4, 1, −10, 100, 10]