

Integration: The definite integral using PLOT variables

When you find roots, intersections, extrema or signed areas in the PLOT view, the results are stored into variables for later use.

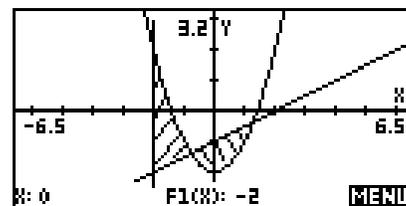
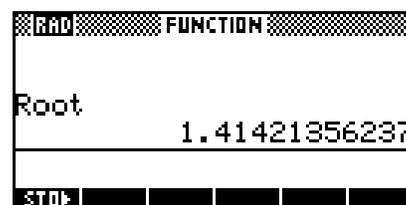
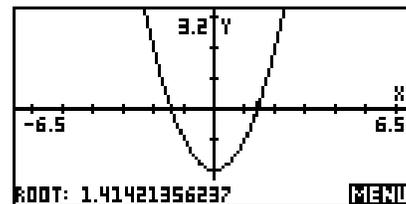
For example, if we use **FCN** *Root* to find the x intercept of $f(x) = x^2 - 2$ then the result is stored into a variable called *Root*, which can be accessed anywhere else. Similar variables called *Isect*, *Area*, and *Extremum* are stored for the other **FCN** tools.

You can access these names by typing them in using the ALPHA key, or by using the VARS key. Press VARS and you will see a list of the HOME variables.

If you press SK2, labeled **APLET** (not the APLET button on the keyboard), then the display changes to show the variables specific to whatever aplet you are currently using. Those shown right are for the Function aplet and the group of *Plot FCN* variables is shown.

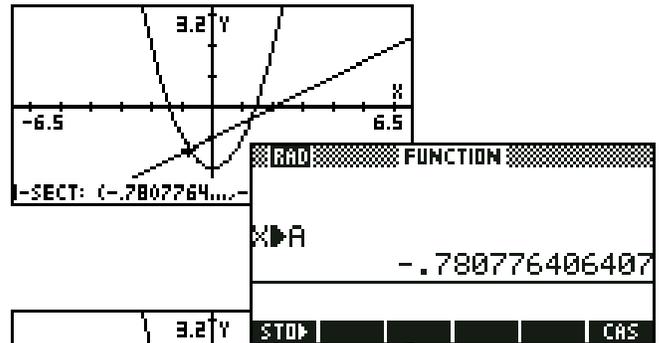
If you look at the screen shot you will see that the **NAME** tag is currently selected (showing as **NAME**) and this means that when you press **OK** the name of the variable will be pasted into what ever view you were using when you pressed the VARS key. Pressing the **VALUE** screen key will cause the *value* of the variable to be pasted instead. There is no effective difference in most situations.

This can be very useful in finding areas, as you will see in the following example. Suppose we want to find the area between $f(x) = x^2 - 2$ and $g(x) = 0.5x - 1$ from $x = -2$ to the first positive intersection of the two graphs.

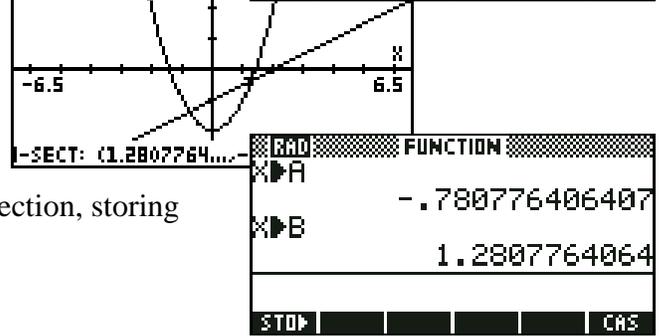


From the hand shaded screenshot shown above right it can be seen that to find the area we need to split it into two sections, with the boundaries being -2 and the two intersections.

After finding the first intersection using **FCN Intersection** we change into the HOME view and store the results into memory variable A.

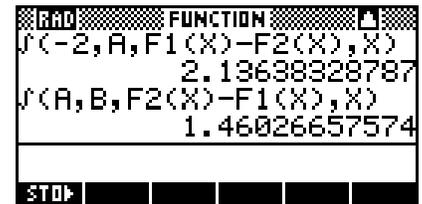


Providing that you have been careful not to move the cursor, the variable X will always contain the last position of the cursor in the PLOT view.



We then do the same thing for the second intersection, storing the result into B.

We can now calculate the area in the HOME view, using $f_1 - f_2$ for the first and $f_2 - f_1$ for the second. Use **COPY** to duplicate the first integral and edit it to adjust the functions and limits.



Finally, **COPY** the two solutions and add them to give the final answer.