HOW TO USE DERIVE (BASIC)

Derive is a software tool (developed by Soft Warehouse, Inc.) for symbolic manipulations and graphing. It can handle arithmetic, algebra, calculus, and a lot of other mathematics. It is the same engine driving many of the calculations done by the TI-89 and TI-92 calculators.

You begin by authoring an expression in the space at the bottom of the screen. While you are doing this you may use any of the symbols at the bottom of the screen. You may also use the usual symbols +, -, *, and / for addition, subtraction, multiplication, and division, respectively. Use ^ for exponentiation: 2^4 means 2^4. You cannot do anything but edit the expression until you hit **Enter**. At that point the expression will be copied to the algebra window.

Once you have authored an expression, you may simplify it by using the = button on the toolbar, or approximate it by using the $\approx$ button.

Exercise 1: Try some arithmetic. Enter and simplify each of the following expressions. After you have simplified, try using approximate. $\frac{2(8+7)}{3^2}, \frac{25}{48}+\frac{27}{64}, (\frac{7}{8})^{99}, \sqrt{982.615}.$

Exercise 2: Now try a little algebra. Enter and simplify the following. Watch your parentheses! $\frac{2x}{x^2-1}+\frac{1}{x-1}, x^2-(x+(y+1)^{50})(x-(y+1)^{50}).$

Exercise 3: Derive also factors. Notice that there is not a button for factoring. You have to go to the **Simplify** menu and choose **Factor**. Then you have a choice as to the kind of factoring you are going to do. Then you may need to simplify your answer.

Enter and factor your social security number. Then factor $2x^3-12x^2+18x.$

Exercise 4: **Expand**: Try expanding $(x+1)^7$. This is on the **Simplify** menu, and you have similar choices to those for **Factor**. Once you have expanded this expression, try factoring it. Do you get the same thing you started with?

Exercise 5: **Solve**: Try solving $x^2-5x+6=7$. (**Solve** is the magnifying glass icon with the equal sign in it.) Try solving $5x-2=\frac{3x}{7}$. Try solving $ax^2+bx+c=0.$

Exercise 6: **Substitute**: Author an equation in two variables, say $3yx - y^2$, and try substituting numbers in for y and x using the **Substitute** command (**Sub**) on the toolbar). Remember that Derive assumes you are working with whichever expression is highlighted, so select the proper expression before you select the command.

You need not substitute a number. Try substituting x^2 for x, for example. You can even substitute an entire expression for a variable. Entering #4 in the proper box, for instance, substitutes expression #4 into the appropriate place.

Exercise 7: Finally, try some graphing. Author an expression in one variable, say $x^2 - 1$. Open a two-dimensional plot window by clicking on the 2D-plot window button, which looks like an xy axis system with a graph on it, or by selecting **Window** > **New 2D plot Window** from the menu. Then plot a graph of your expression by clicking on the plot expression button, which looks exactly like the 2D-plot window button, or by selecting **Insert** > **Plot** from the menu.

You can remove the graph by choosing **Edit** > **Delete** from the menu. You will have a choice of what to delete.

You can return to the algebra window by clicking on the algebra window button, which looks like an outline, or by selecting the **Window** > **Algebra** command.

Exercise 8: Now try a non-trivial graph. Have Derive plot the expression $e^x(x^4+1)$. You'll have to enter e^x as *exp(x)* or as $\hat{e} \wedge x$, which requires clicking on the $\hat{e}$ button on the lower right toolbar of the screen. You cannot simply enter $e \wedge x$, because Derive would think that e was just another variable.

Once you have the graph, do the following.

- Find the x and y intercepts, if any
- Find the maximum and minimum points, if any
- Find where the function is increasing and where it is decreasing

Derive has many other capabilities. Play with it and have fun!