Assignment 1: Expressions and Functions (0.1&2) **Name**_____
Please provide a handwritten response.

1a. *Derive* can be used just like an ordinary calculator; addition is denoted by +, subtraction by -, multiplication by *, and division by /. For example, $\frac{3.017(56+45.26)}{-97.3}$ would be represented in *Derive* by selecting **Author→Expression**, then typing 3.017(56+45.26) / -97.3. **(Do not type the last ".")** Press ENTER on the keyboard.

What does *Derive* show? To obtain a numerical value, highlight the expression then select = from the shortcut menu. Record the result below. Does your calculator agree? Highlight the expression again and select ≈ from the shortcut menu. Record the result below. Does your calculator now agree?

1b. Exponents are denoted in *Derive* using the ^ symbol, located about the "6" on your keyboard. Enter 4^2 by clicking on the shortcut menu followed by entering 4^2. (is a shortcut for **Author→Expression**. You can also simply click inside the Author box at the bottom!) Next, use = to evaluate the expression. Repeat with 27^(1/3). Are your results correct? Explain.

1c. Find $\sqrt{25}$ by **Author**ing sqrt(25) then = to evaluate. Record your result below.

1d. What happens when you use = to evaluate sqrt(26) to find $\sqrt{26}$? The reason *Derive* does not give you a decimal answer is that $\sqrt{26}$ is an irrational number, and therefore cannot be exactly expressed as a decimal. However, we can approximate the value by highlighting it, then clicking ≈ from the shortcut menu. Do this and record the result below. (Any time you wish to approximate an expression or value, simply click ≈.)

2a. You can also apply these operations to a variable, say x, to create algebraic expressions in *Derive*; for example, the expression $\frac{x^2+7x-11}{x^2-4}$ would be represented by **Author**ing (x^2 + 7x – 11) / (x^2 - 4)

(Note that the multiplication symbol * is not necessary between the 7 and *x*. Also, note the use of parenthesis.) Did *Derive* change the expression in any way? If so, how?

2b. Often we want to substitute a particular value of x, say x = -2.3, into an expression like the previous one. This is done in *Derive* by clicking **Simplify →Variable substitution**, then specifying the variable and its substitution. In this particular example, we would use x as the variable and –2.3 as the substitution. Select **OK**. Next, use = and ≈ to simplify the expression. Record the results below. Which result does your calculator agree with? (Also try Sub_B.)

3a. Just as in precalculus, we can also use our expression $\frac{x^2+7x-11}{x^2-4}$ to define a rational function $f(x)$ in *Derive*. **Author** the expression f(x) := (x^2 + 7x – 11) / (x^2 – 4) and record the result below. (The := is created by typing ":" followed by "=". This is *Derive*'s method of defining a function.)

3b. **Author** and use ≈ to approximate $f(-2.3)$; your result should agree with that of Question **2b.** Does it?

3c. A more efficient way to evaluate $f(-2.3)$ is to **Author** f(-2.3) =. (Do not include the period!) Do this and record the result below.

3d. **Author** and approximate f(2) to try to calculate $f(2)$ and describe the result below.

3e. Make *Derive* "forget" about our definition of $f(x)$ by **Author**ing f(x):= . (You will not see any output from this.) Next, **Author** f(x):=sqrt(x+1) and use *Derive* to evaluate $f(0)$, $f(3)$, $f(-1)$, and $f(1/2)$. Neatly record the results below. (Anytime we re-define a function as something new, Derive "forgets" about the old definition; it is not necessary to Author f(x):= each time before re-defining a new function.)