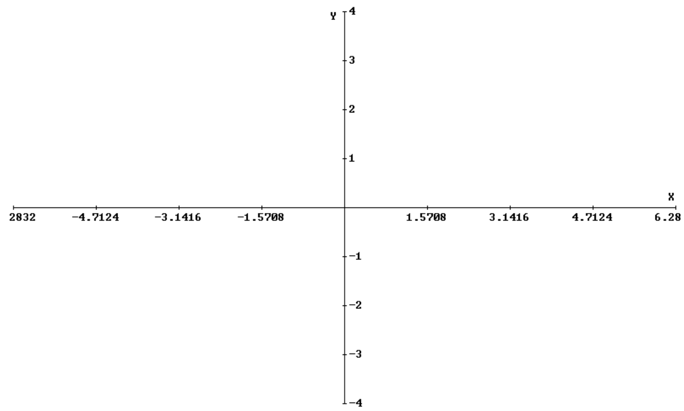
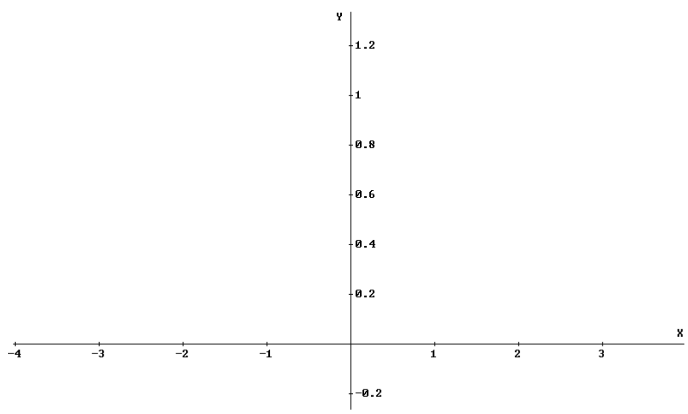
Assignment 4: Trigonometry and Exponentials (0.5&6) Name___________________
Please provide a handwritten response.

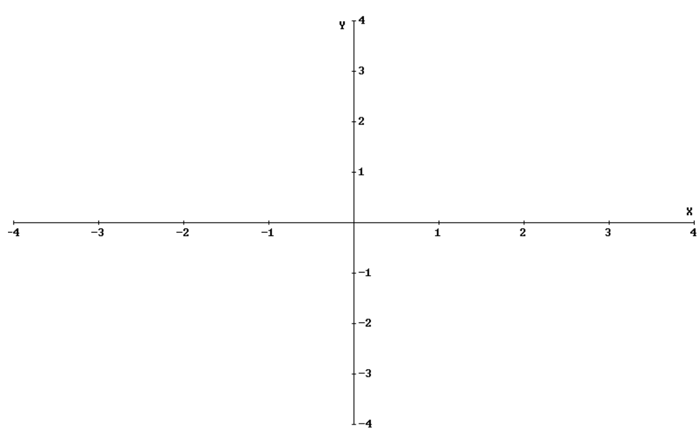
1a. In *Derive*, $\sin(x)$ is expressed simply as "sin(x)" and the constant π is denoted by "pi". We can plot the sine function over the domain $-2\pi \le x \le 2\pi$ by **Author**ing sin(x), highlighting the expression, selecting [plot icon] to open a 2D-Plot window, clicking **Set → Plot Range** to specify **-2pi** as the min and **2pi** as the max, and then clicking [plot icon]. Execute these commands and sketch the result on the axes at right. (*Derive* assumes we mean $y = \sin(x)$ when we plot the above expression.) *Derive* may show 2832 on the *x*-axis. What value should this be? Why did *Derive* denote the value as 2832?



1b. More complicated trigonometric functions can also be used, but we must be very careful when writing expressions. For example, the function $y = \sin^2(x)$ would be entered by **Author**ing (sin(x))^2. Do this and record *Derive*'s output below. Is this good notation? Plot the function and sketch the result on the axes at right.



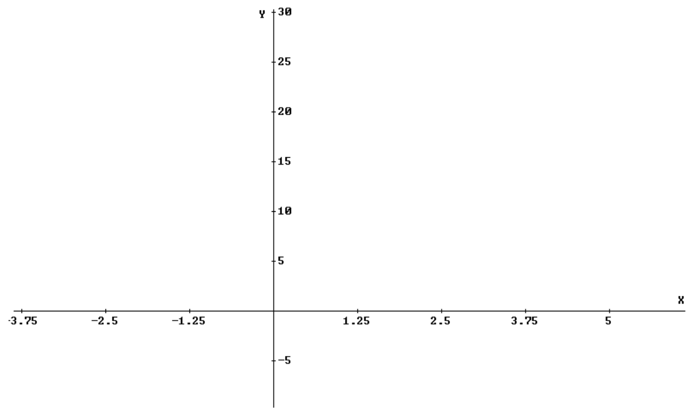
1c. The cosine function $\cos(x)$ is represented in *Derive* by "cos(x)" and the tangent function $\tan(x)$ as simply "tan(x)". For example, the function $f(x) = \cos 5x + 3\sin 5x$ would be used in *Derive* by **Author**ing f(x) := cos(5x) + 3 sin(5x). (Note the use of parenthesis!) Execute this command, then plot the function. Sketch the result on the axes at right.



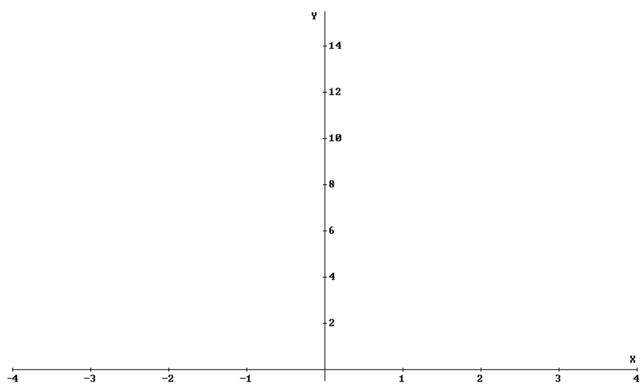
1d. All six trigonometric functions in *Derive* assume that the variable is measured in radians, not degrees. **Author** then click = to simplify the following: $\sin(\pi/2)$, $\cos(\pi/4)$, and $\tan(-\pi/3)$. Using good notation, neatly record the results below; were the answers what you would expect?

2. The deg constant can be used to express degree measure. For example, **Author** then click = to simplify sin(60deg) to find $\sin(60^{\circ})$. Record the result; is it correct?

3a. Exponential functions in *Derive* are expressed using the ^ symbol just like any other exponent. For example, to plot the function $y = 2^x$ we would **Author** y = 2^x, use to switch to a 2D-Plot window, then to plot the expression. Do this and sketch the result on the axes at right. Adjust the view by clicking the zooming icons, , to get a "good" view of the graph. Experiment!



3b. The special constant $e \approx 2.71828$ is represented in *Derive* as #e and the function e^x is represented either by #e^x or exp(x). **Author** $f(x) = 10e^{-x/3}$ by entering f(x) := 10 #e ^ (-x / 3). Plot the function and sketch the result on the axes at right.



4. In *Derive* the natural logarithm function $\ln(x)$ is represented by "ln(x)", whereas the logarithm, $\log_b x$, of x with base b is denoted "log(x, b)". To enter $\ln(x)$ and $\log_{0.5} x$, we would **Author** ln(x) and log(x, 0.5). Do this and plot both graphs on the same axes. Sketch the result on the axes at right.