Technology Project #1—Introduction to Mathematica

Download and Orientation of Mathematica:

Watch the following You-tube video on how to download Mathematica and an orientation of how to use different features in Mathematica.

https://www.youtube.com/watch?v=zytXSBxZcwM

Steps to Download (same as first part of the video):
You can now download and install Mathematica for free. Once you have downloaded it to your personal computer you can use it for free until you graduate.
Here are the steps:

1. Create a Wolfram ID at https://user.wolfram.com/portal/registration.html . Make sure that you use your byui.edu email address.
2. Double check that you used your byui.edu email address to create your Wolfram ID.
3. Go to the following URL: https://user.wolfram.com/portal/requestAK/bed4c87ba2e6ae311159d375f3aca12c7e19929f
4. Enter your Wolfram ID and password that you just created. Then follow the prompts.

Note: if you have already done this, skip this part of the assignment.

Watch Videos:

In order to orient yourself to Mathematica, go to the following website and watch the first four videos (Notebooks, Methods to Get Started, Basic Calculations, and Basic Graphs). There is approximately 30 minutes of video time.

Website: http://www.wolfram.com/broadcast/screencasts/handsonstart/

The notebook video provides an overview of how to make your assignments neat, organized, and pretty. You will be expected to use the title and subsections features for each of your assignments. In some of the videos, you will see the person using the free-form (the little orange box) to input the information. If you need to do this to learn the code, that is fine. But, you must delete it and put in the actual Mathematica code for these technology assignments. In the end, you should have no orange box's or enable dynamics on your notebook.

Assignment: Create a new Mathematica notebook with a title cell and subtitle cell. Answer each of the following questions in a new section cell.

1. Use Mathematica to draw the graph of each the following functions. For each graph, adjust the window size so it shows the features of the graph well.
   a. $y = 3x^2 - 2x + 4$
   b. $y = -5\cos(2x) - 7$
   c. $y = \frac{4x-2}{x^2+3x+1}$

2. Use Mathematica to graph the functions $y = 4x^2 + 2$ and $y = -2\tan x$ on the same coordinate axes. Change the color of the graphs, using two different colors, so that the two graphs remain distinct.

3. Use Mathematica to evaluate the following limits:
   a. $\lim_{x\to 4} \frac{x^2 - 5x + 4}{x - 4}$
   b. $\lim_{x\to 0} \frac{3\sin(4x)}{6x}$
   c. $\lim_{x\to \pi} 1 - 3\cos x$

Avoiding Common Mistakes on TP #1 ☺

If you try using a Mathematica command and get an error – look for these common mistakes:

- ✓ Because we are using the Mathematica programming language, **you should not use the free-form input feature**. If you see an orange equal sign you are using the free-form input and might run into problems!
- ✓ If Mathematica recognizes the command it will go black (except for the variable). Thus if you see a blue command it is because Mathematica is not recognizing the command; check capitalization, brackets, etc.
- ✓ Remember to capitalize! Mathematica is case-sensitive. "Plot" is not the same thing as "plot".
- ✓ Check your brackets and parentheses. If you have the wrong type of brackets or parentheses, Mathematica will give you an error. Generally, you use parentheses to group mathematical terms together. For example $x(x-3)$. You use square brackets as part of a built-in Mathematica command: $\mathrm{Sin}[x]$.

- ✓ Check commas. Compare your work to the example provided in the assignment. Make sure you have commas located in the correct places.
- ✓ Don't copy and paste from a pdf file or Word document into Mathematica! If you do, the command might look perfect but not work right. Mathematica doesn't read text from other sources very well. Retype it!
- ✓ Entering $\cos^2(x)$ is a little tricky. The Mathematica command would be: $\text{Cos}[x]\text{^}2$

Here are some other things that students often lose points for:

- ✓ Make sure you follow the directions to create a new Mathematica notebook with a title cell and subtitle cell. Answer each of the questions in a new section cell.