APPM 2450 Calculus 3 Computer Lab
Lab Exercise 9 - Introduction to Mathematica Programming

Create a Mathematica notebook that does all of the following. Feel free to ask your neighbor or your lab instructor for help if you get stuck. Items with a ➠ are required, items with a ☆ are optional.

In the following exercises be sure to only use local variables.

- ➠ Write a function that converts cylindrical coordinates to rectangular. Test the function with a few cases.
- ➠ Write a function that converts rectangular coordinates to cylindrical. Be careful that your θ calculation works for all cases. Test the function with a few cases.
- ➠ Write a function that computes the following piecewise defined function,

$$f(x) = \begin{cases} 0 & x < -\pi \\ \sin(x) & -\pi \le x < 0 \\ x^2 & 0 \le x < 2 \\ 4 & x \ge 2. \end{cases}$$

- ➠ Plot the above, and calculate its integral for $-7 < x < 5$.
- ➠ Come up with a mathematical function that has two discontinuities. Write a function in Mathematica that computes it. Use your newly created mathematica function to plot, and integrate it over a domain of your choice.
- ➠ Write a *functional* program that computes $n!$. Output the first 10 $n!$ values.
- ➠ Go to 'Kernel', then 'Delete All Output'. Save your notebook as *YourLastName_YourFirstName_worksheet9.nb* and send it to your instructor.