Note: The output column header of each function (“x Sin Library Difference”) may be uneven with the provided output columns depending on which program is being used to display them due to tab formatting differences. The output of the values, however, are exactly as specified in the lab document. On the Unix timeshare, through PuTTY, the output and column headers are aligned.

Results of Sin():

The largest differences between my Sin function and math.h’s sin function are seen at the high and low ends of the given range (-2pi to 2pi) and are no more than 0.1050386974. Also, as the x value gets closer to the center (0), my function’s accuracy improves. I believe this is due to the given Pade approximations divergence from the true values for sine seen in the graph shown in the lab document (shown below). I believe that my Sin function is sufficient in approximating values within the given range for sine. If I wanted to make my function more accurate I would use a Pade approximation with a higher order, thus minimizing the difference between the true value and my output.

Results of Cos():

The largest differences between my Cos function and math.h’s cos function are seen at the high and low ends of the given range (-2pi to 2pi) and are no more than 0.2723585573. Also, as the x value gets closer to the center (0), my function’s accuracy improves. I believe this is due to the given Pade approximations divergence from the true values seen for cosine in the graph shown in the lab document (shown below), (figure shows a sine wave, however I would argue that the divergence would be the same in a cosine wave as well). I believe that my Cos function is sufficient in approximating values within the given range for cosine. If I wanted to make my function more accurate I would use a Pade approximation with a higher order, thus minimizing the difference between the true value and my output.

Results of Tan():

The largest differences between my Tan function and math.h’s tan function are seen at the high and low ends of the given range (-pi/3 to pi/3) and are no more than 0.0000000000. Also, as the x value gets close to the center (0), my function’s accuracy improves. I believe this is due to the given Pade approximations divergence from the true values seen for tangent in the graph shown in the lab document (shown below) (again, figure shows a sine wave, however I would argue that the divergence would be the same in a tangent wave as well). I believe that my Tan function is sufficient in approximating values within the given range for tangent. If I wanted to make my function more accurate I would use a Pade approximation with a higher order, thus minimizing the difference between the true value and my output.

Results of Exp():

My Tan function is quite similar to the math.h's exp function, the largest difference being 0.0000000003. This is because of how perciese my epsilon, or error term, is. If I wanted to be more precise with my approximation I would simply change my epsilon to a smaller number.

Figure shown in lab document:

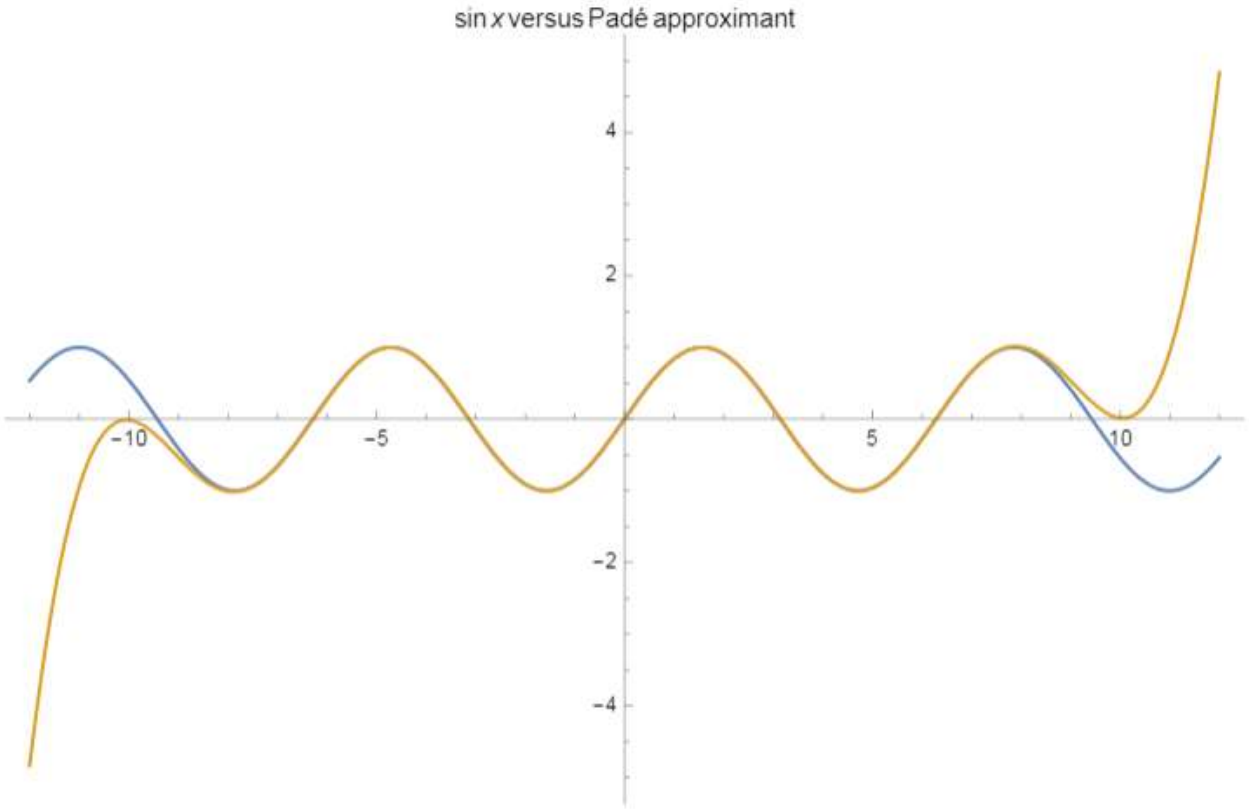

Figure 3: Comparing sin(x) with an order 10 Padé approximant.