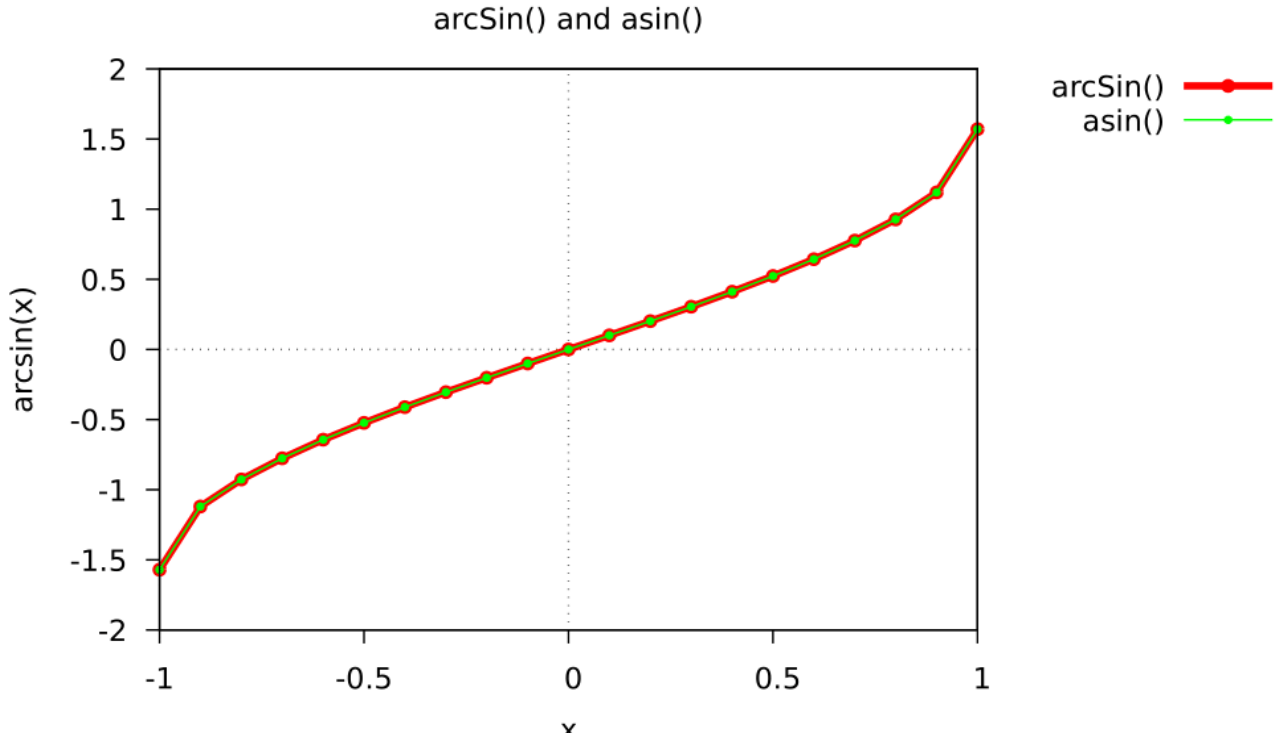
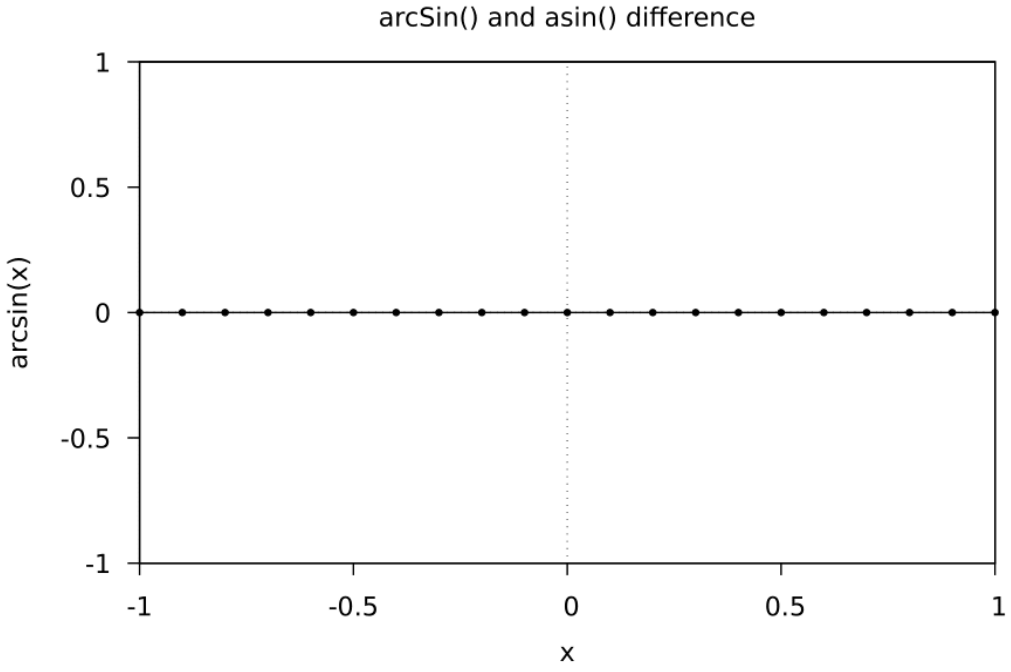
Assignment 2: A Small Numerical Library

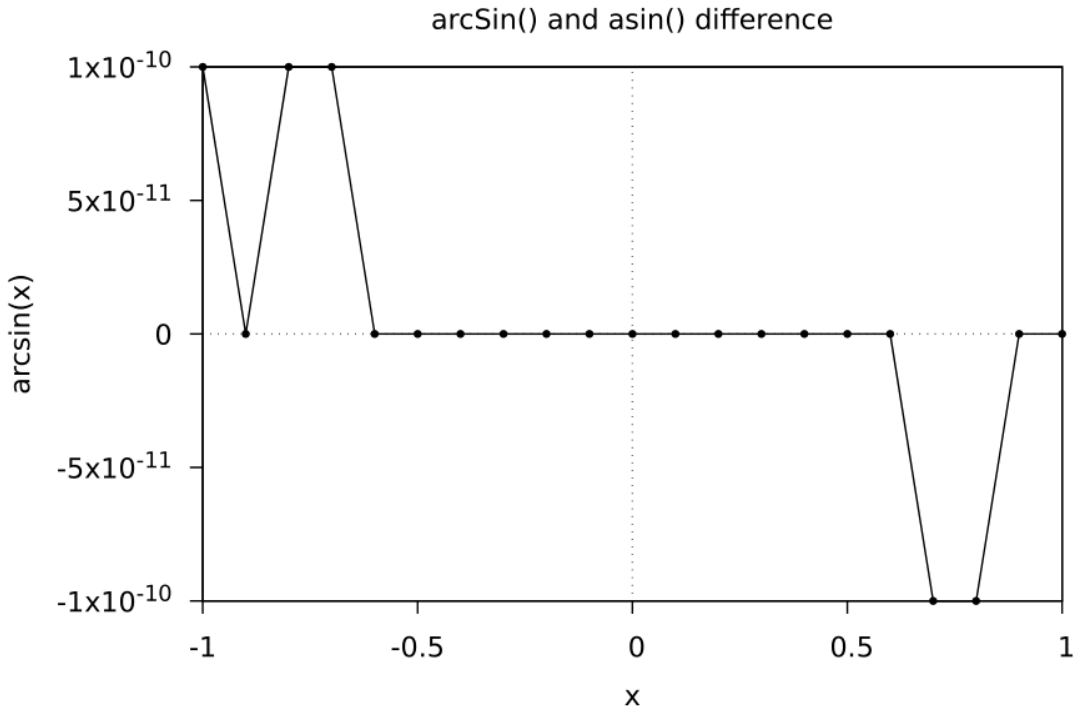
arcSin():

In the 10 decimal points that are printed in the table there is no visual difference between the output of my arcSin function and that of the function provided by math.h. This of course does not mean that there is not any difference as can be seen by the differences being positive or negative zero. This can be seen in these graphs.



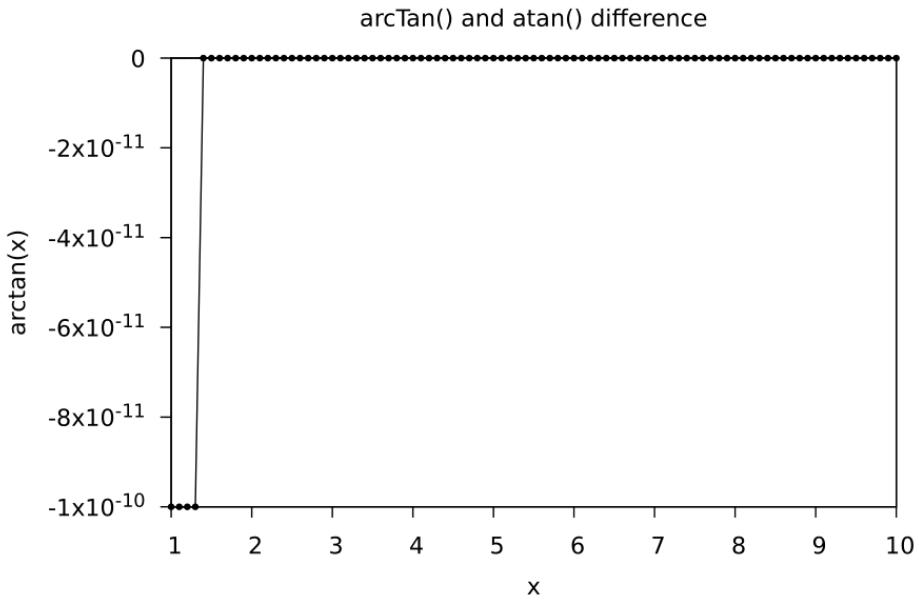


If I increase the EPSILON constant by a little bit you can begin to see some flaws in my function. As visualized in the graphs below, leading up to .8 and -.8 there begins to be a bit of difference between the two functions. This is due to how my code is set up where it begins to use the trig identity to redefine x, when the absolute value of x is greater than .8. When I was fixing the inaccuracies of my initial Taylor Series expansion around 1 and -1 I basically just eyeballed where I thought the graphs started to diverge, so it would make sense that the parameter I set for redefining the x value is pretty inaccurate.



arcCos() and arcTan():

Given that both the arcCos and arcTan functions were purely dependent on the effectiveness of the arcSin function, they have very similar results. As shown in the graph below, arcTan also shows some differences around 1 when I increase the EPSILON.



Log():

My log function also has no visible differences within 10 decimals points to the function provided by math.h. Even if I increase EPSILON to the value that produced differences in the arcSin/arcTan it still shows no difference as in the graphs below. This could show that Newton's Method is simply just a more accurate way of approximating these functions than the Taylor Series method.