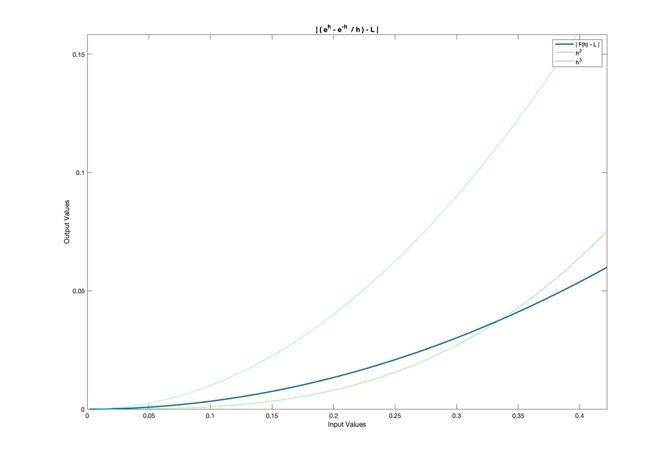
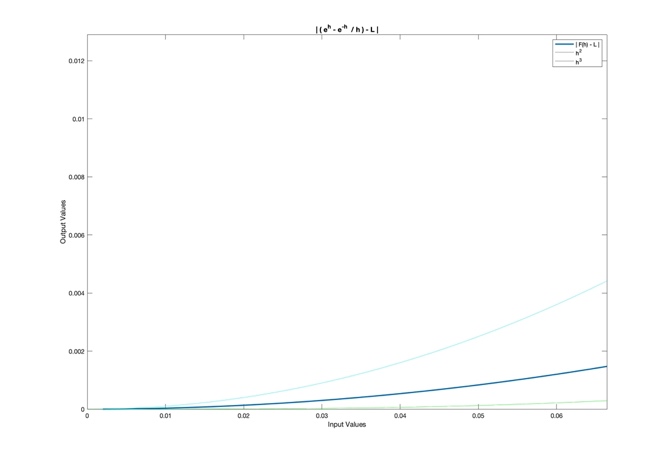
MACM 316 Computing Assignment #1

1. By using different values of *h* we can see that as *h* goes to 0, *F(h)* approaches 2. If *h* is chosen too small, however, the numerator runs the risk of a cancellation error due to bit-limiting factors in the mantissa. Since will evaluate arbitrarily close to as *h* 🡪 0, cancellation errors caused by rounding will lead to incorrect results in the computation.
2. Since *F(h)* evaluates to 0/0, to find the limit of *F(h)* we will use L'Hôpital's rule in the third equality of the following:

Comparing with and in the graphs above we can see that for and that for sufficiently small h. Indeed, it can also be shown using Taylor Series for that . Hence, as converges to its limit, 2, about as fast as converges to 0.