Lab 3

Kebur Fantahun
Department of Physics
TTU—Texas Tech University
Lubbock, Texas, <u>U.S.A.</u>

February 14, 2018

1 Part 1. Precision of Numerical Differentiation

The slope of the plots inside each region agrees with my expectations. The region of decreasing slope is where the round-off error dominates. The region of increasing slope is where the approximation error dominates. At first the slope did not agree but after correcting the spacing of the range of h the slopes began to look like $\mathcal{O}(h)$ and $\mathcal{O}(h^2)$ respectively. The section **??** depicts the median relative error plots from attempting to take three first derivatives and one second derivative of the functions $exp(x)$, $ln(x + 1)$, and $sin(2x)$.
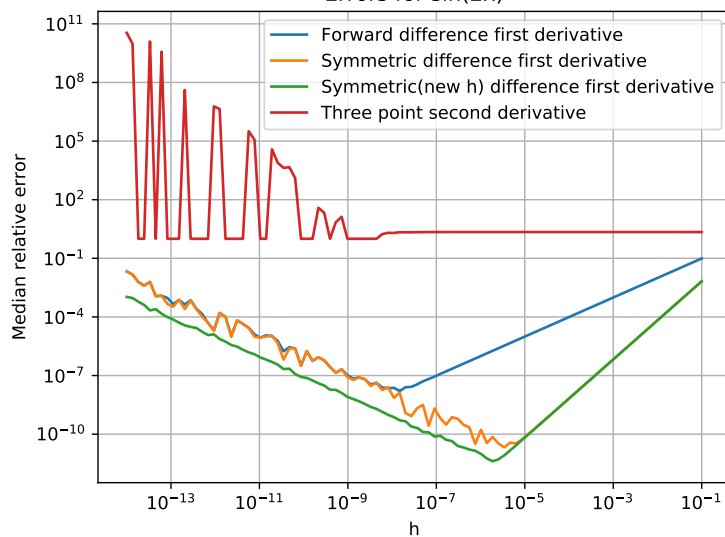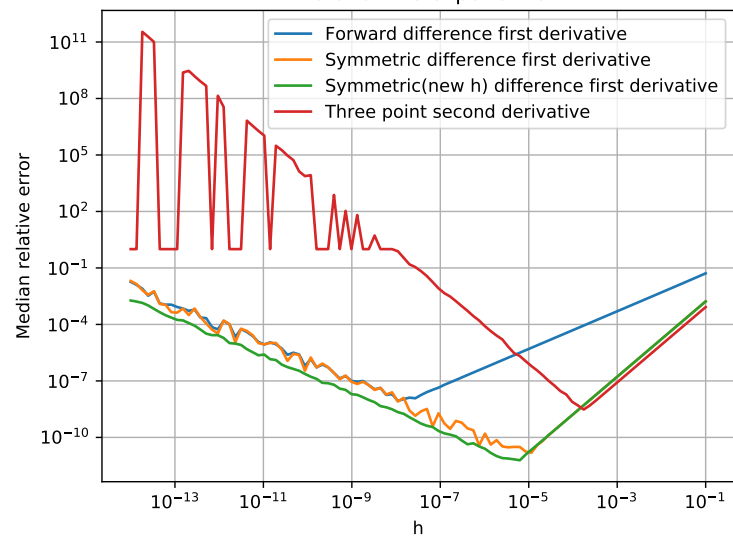
2 Plots

Errors for the ln(x+1)
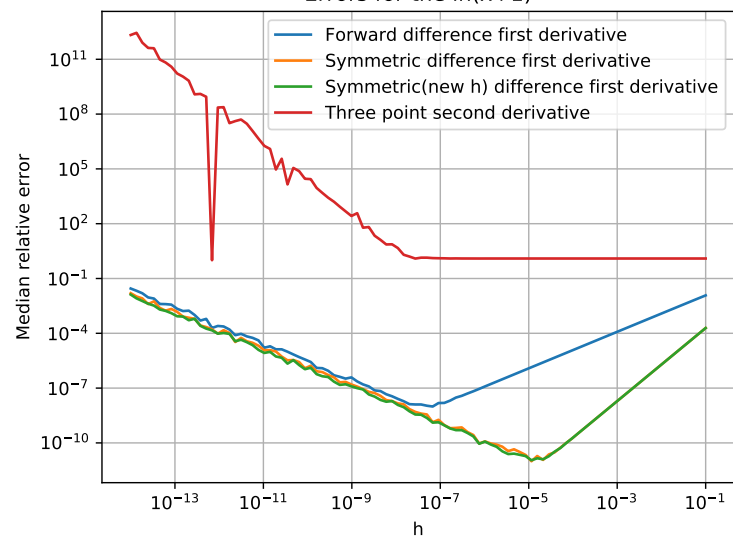
Errors for sin(2x)

Errors for the exponential

3 Part 2. Optimizing Projectile Firing Angle

4 Choices

In this section, I will describe the choices for certain parameters and reasons for those choices.