include your plot and describe the key features of it

As the value of P increase the step size gets smaller, but large changes seem to stop around p 0 5 or h = 0.03. See figure on next page

including the approximate slope of each line,
Aprx Slope at x = 2 is:

Avg Slope P 1 is: -9.259563781596993
Avg Slope P 2 is: -5.762931529041609
Avg Slope P 3 is: -3.0860815534044237
Avg Slope P 4 is: -1.57933546779237
Avg Slope P 5 is: -0.7966230540812476
Avg Slope P 6 is: -0.3997717842009136
Avg Slope P 7 is: -0.20021536397539236

what you think the convergence rate is for the true relative error for each state variable, and if these results make sense to you (and why or why not).

As p increase the value of h decreases when h = 0.5^p as step size increases, we would expect the true error to decrease. In the below true error read is using p =20 for the true error value we see the expected decrease trend of true error as we get closer and closer to the value at x = 2

True error P= 1 is 0.4526909722201
True error P= 2 is 0.13462999131732234
True error P= 3 is 0.03537835014978752
True error P= 4 is 0.008999612594177808
True error P= 5 is 0.0022655261866222354
True error P= 6 is 0.0005680997317338843
True error P= 7 is 0.0001422250363449784