Homework One: Problem Three

5 Points: Solve the following exercises and submit your answers in a pdf file using any formatting (+2 points for using LATEX formatting):

1. What are the approximate absolute and relative errors in approximating π by each of the following quantities (**Absolute error** = approximate value - true value and **Relative error** = (approximate value - true value)/true value)?

   (a) 3
   Absolute error = (3-π) = -0.14159265358979323846264338327 95
   Relative error = (3-π)/pi = -0.045070341448627985386697419764 91

   (b) 3.14
   Absolute error = (3.14-π) = -0.00159265358979323846264338327 95
   Relative error = (3.14-π)/pi = -5.069573828972913714099660206098 1e-4

   (c) 22/7
   Absolute error = ((22/7)-π) = 0.00126448926734961868021375957764
   Relative error = ((22/7)-π)/pi = 4.024994347706819758407983415188 5e-4

2. Consider the problem of evaluating the function sin(x), in particular, the propagated data error, i.e., the error in the function value due to a perturbation h in the argument x.

   (a) Estimate the absolute error in evaluating sin(x)
   Absolute error = DON'T UNDERSTAND HOW TO FIGURE THIS OUT

   (b) Estimate the relative error in evaluating sin(x)
   Relative error = DON'T UNDERSTAND HOW TO FIGURE THIS OUT

   (c) Estimate the condition number for this problem.
   Condition number = DON'T UNDERSTAND HOW TO FIGURE THIS OUT

   (d) For what values of the argument x is this problem highly sensitive?
   If you look at the graph for sin(x) you find curve peaks at ..., -

2π, -π, 0, π, 2π, ... and this is where it's highly sensitive as the derivative changes drastically ...