CSCE 488, fall 2001 HOMEWORK 5

Due Date: Wednesday, November 14

Purpose: This assignment allows you to try your hand on program benchmarking and statistical topics discussed in lecture on September 19. *Remember that in order to measure trends you need to average over several inputs of the same size*. This is an individual assignment (not a team assignment) so you should work independently!

1. Write a program to execute the following function, and estimate its execution time on cse:

$$P_x = \prod_{i=1}^{N} \left(\frac{x}{x+1} \right),$$

where x is the double-precision floating point equivalent of i.

Using data from several runs, find an expression for the CPU time required to execute this process, as a function of N (I anticipate it will be linear, i.e. $t(N) = aN + b$).

2. Repeat Problem 1 for the function[1]:

$$P_{sqrt} = \prod_{i=1}^{N} \sqrt{\frac{x}{x+1}}$$

3. Use the data from Problems 1 and 2 to estimate the CPU time required to execute one invocation of the square-root function.

4. Write a report on your experiment (in a **single** pdf file), detailing your methodology and your results. Be sure to provide a statistical analysis (with confidence intervals) of your numbers sufficient to give credibility to your results. Include the complete, well-documented code as an attachment to your email.

Grading will be based on:

1. The correctness and completeness of your experimental approach and your statistical analyses.
2. The quality of your writing, including adherence to the style specification.
3. The organization, clarity, and completeness of your report, i.e. how well it "documents, explains, and convinces".
4. The readability of your source code.

[1] Both of these functions have simple "closed form" solutions that you can use to verify their correctness.