Show all your work/calculations. You may write the calculations by hand but it must be VERY CLEARLY READABLE!!! Or you can do it on a spreadsheet. (Recommended) Discussion questions must be typewritten.

Consider the following program.

We have a sequential program with $T_1 = 1000$. The sequential portion is 250 and the portion that can be parallelized is 750.

1. Based on Amdahl’s Law calculate $T_P$ and Speedup and Efficiency for $P = 2, 10, 50, 100$.

2. How many processors should be used to achieve the minimum time possible. What is that time? Calculate Speedup & Efficiency for that number of processors.

3. Discuss and explain the overall trend in performance as $P$ increases (for this program) using Amdahl’s law calculations and perspective.

4. Based on Gustafson-Baris Law calculate $T_1$, $T_P$, Speedup & Efficiency for the following conditions. [Amount of increase in sequential portion = (Parallel/Original Parallel) *2]
   a. $P = 10$ (Note: $T_1$ changes for each part)
      i. Parallel section is 750 – Sequential is 250
      ii. Parallel section is 3000 – Seq. 258
      iii. Parallel section is 75,000 – Seq. 450
      iv. Parallel section is 30,000,000 – Seq 80,250
   b. $P = 1000$
      i. Parallel section is 750 - S = 250 (original problem)
      ii. Parallel section is 3000 – S = 258
      iii. Parallel section is 75,000 – S = 450
      iv. Parallel section is 30,000,000 – S = 80,250

5. Discuss and explain the overall trend in performance as the program size increases & number of processors increases (for this program) using the Gustafson-Baris law calculations and perspective.

6. Explain the different viewpoints provided by these 2 laws.