

IMPORTANT INSTRUCTIONS:

Open-book/open-notes/open-web/closed neighbor/open-calculator. Put one problem per page on separate paper, using one side of a paper only (scratch paper on the back). Subparts of a problem can go on the same page (i.e. 1.1, 1.2, 1.3 can all go on the same page if they will fit.) Leave space in the upper left-hand corner for the staple.

- You may turn in the test in person or by email.
- Questions are worth 5 points unless otherwise noted, 100 points total
- Cite any online resources that you used, but do not cut-and-paste, everything must be your own words and your own work.

5 points or more deducted for failure to follow these instructions!

By turning in the exam you are agreeing to abide by the instructions above – no collaboration or collusion or plagiarism.

- Understand the five parallel levels, describe the hardware implementations at each level, and describe the software implementations at each level.
- Be able to explain and apply Amdahl's Law.
- Understand and use the balance-point heuristic.
- Write a simple java thread program, with three threads and a main, sharing processing and passing data/results.
- Flynn taxonomy.
- Pipelines and speedup.
- Caching and high performance computing, understand, explain, discuss.
- Communication latency and its effects on high performance computing.
- Understand our simplified communication time calculations.
- Understand the idea and purpose of multi-stage networks.