

Fall 2020
Exam I
Thursday, October 8

**DO NOT OPEN THIS EXAM UNTIL YOU ARE
INSTRUCTED TO DO SO**

Name: _____ . Student ID No. _____

1. **NO TALKING UNTIL YOU LEAVE THE EXAM ROOM, PERIOD. Not now. Not when you are done. Not when you are collecting your things. Not when you are getting ready for the exam. NO TALKING!** Doing so will earn you an F on the exam, at a minimum.
 2. You May **NOT ASK ANY QUESTIONS DURING THE EXAM** due to Requirements of Social Distancing. Do your best and note any concerns on your page.
 3. **Write only on the front of each page.** Anything written on the back of a page will not be graded.
- **Plagiarism** will earn you an F in the course and a recommendation of expulsion from the university.
 - a. You may not refer to any material outside of this exam.
 - b. That is, you may **not** refer to notes, books, papers, calculators, phones, classmates, classmates' exams, and so forth.
 - c. **Do not talk to fellow students at any time while in the exam room.**
 - Answer all questions on these pages. No code or pseudo-code is necessary – just a precise and concise explanation and justification.
 - *Unsupported work will receive no credit.*

Q1 (6 pts) Assume that Algorithm A runs in $\Theta(n^2)$ time and that Algorithm B runs in $\Theta(n^3)$ time. For large n , which algorithm would you use? Justify your answer (“because it is faster” will earn you exactly 0 points).

Q2 (6 pts) Give the asymptotic number of multiplications performed in the following. Justify your answer.

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For  $i = 1$  to  $n$  do
  For  $j = 1$  to  $i$  do
     $x = i * j$ 
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Q3 (6 pts) Give an asymptotically optimal algorithm to compute the minimum of n values on an EREW PRAM of size n . Justify your answer.

Q4 (6 pts) Give a cost-optimal algorithm of minimal running time to compute the sum of n items on a CREW PRAM. Justify your answer.

Q5 (6 pts) Give an asymptotically optimal algorithm to compute the parallel prefix of n items distributed one per processor on a Linear Array of Size n . Justify your answer.

Extra Credit (1 pt each). Circle the correct answer.

1. “And like one and one don’t make two. One and one make one.”
 - a. Song of The Count
 - b. Bargain
 - c. Born to Run
 - d. Knock Three Times
2. “March of the Wooden Soldiers”
 - a. Abbott and Costello
 - b. The Marx Brothers
 - c. Laurel and Hardy
 - d. Jan and Dean
3. Dr. Miller works in which of the following.
 - a. Machine Learning
 - b. Natural Language Processing
 - c. Embedded Systems
 - d. Molecular Structure Determination
4. What sport does Prof Miller currently play?
 - a. Golf
 - b. Pickle Ball
 - c. Tennis
 - d. Bobsledding

Extra Sheet #1

Extra Sheet #2