

Name: _____ Student Number: _____

CSE4/529

MidTerm I

Fall, 2019

Plagiarism will earn you an F in the course and a recommendation of expulsion from the university. You may not refer to any material outside of this exam. That is, you may **not** refer to notes, books, papers, calculators, phones, classmates, classmates' exams, and so forth. **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) Given n pieces of data to be sorted on a RAM, describe a linked list implementation of QuickSort. Give the asymptotic running time of your algorithm. Justify the correctness of your algorithm as well as the analysis of its running time.

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Q2 (6 pts) Given n values stored in the global memory of an EREW PRAM, give a cost-optimal algorithm of minimal running time to determine the parallel prefix (Min) of these n values. Justify your result.

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Q3 (6 pts) Given n values, evenly distributed amongst the processors of a tree, give a cost-optimal algorithm of minimal running time to determine the parallel prefix (Min) of these n values. Justify your result.

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Q4 (6 pts) Order the following functions by growth rate: $n, \frac{1}{n}, n^{1/3}, \log n, 75, n^{1/2}$.
Justify/prove your answer.

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Q5 (6 pts) Given a mesh-of-trees of base size n with one piece of data distributed per base processor, give an optimal algorithm to determine the sum of these n values. Efficiency counts. Justify your result.

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