

NAME: \_\_\_\_\_ Student Number: \_\_\_\_\_

CSE4/529

**MidTerm I**

Fall, 2017

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.

Answer all questions on these exam pages. No code or pseudo-code is necessary – just a precise and concise explanation and justification. *Unsupported work will receive no credit.*

Q1 of 5 (6 pts) Given  $n$  values, evenly distributed amongst the processors of a linear array, give a cost-optimal algorithm to determine the sum of the values. Running time counts.



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Q2 of 5 (6 pts) Given  $n$  values, evenly distributed amongst the processors of a CREW PRAM of size  $n$ , give an efficient algorithm to determine the sum of these values. Running time counts.



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Q3 of 5 (6 pts) Given  $n$  values, evenly distributed amongst the processors of a PRAM, give a cost-optimal algorithm with minimal running time to determine the sum of the values.



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Q4 of 5 (6 pts) Given  $n$  values, evenly distributed amongst the processors of a mesh of size  $n^{2/3}$ , give an asymptotically optimal algorithm to determine the sum of the values. Argue that any other configuration of a mesh will lead to an asymptotically inferior running time.





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Q5 of 5 (6 pts) Given one value per leaf processor on a standard tree with  $n$  leaf processors, give an efficient algorithm to determine the parallel prefix of these values. Running time counts.

