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.
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.
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.
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.
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.