CSE 3101: Design and Analysis of Algorithms
Assignment 3 Do not submit - solutions will be posted soon

Notes:

- Feel free to refer to, and use any facts from the textbook.
- Please try to solve the problems before looking at the solutions.
- For each question, you must prove that your algorithm is correct, unless otherwise stated. Also, when you are asked to design an algorithm, you get full credit only if you produce the best possible algorithm (in terms of asymptotic running time).

Problems:

1. Problems that complement the lectures:
   (a) Prove that Counting-Sort is correct (without looking at the book). As part of this, write down the loop invariants for each loop.
   (b) Prove the correctness of radix sort (without looking at the book).
   (c) Q 2.2-2, 8.2-3 in the second edition.
   (d) Q 8.3-3 in the second edition.
2. Solve problems 9.3-5, 9.3-7 from the second edition.
3. Solve problem 52 on page 256 (Supp 59) of the PoA book.
4. Solve problem 33 on page 252 (Supp 55) of the PoA book.
5. Assume you have a special hardware component that could find the minimum of $\sqrt{n}$ numbers in one step. Give upper bounds for sorting using this component.
6. Solve problem 62 on page 260 (Supp 63) of the PoA book.