CSE 3500: Problem Set 3
Due by 11:59 PM on Monday, Oct 16.

Please note:

- *Students are permitted to discuss general concepts and questions concerning the homework assignments, but sharing written solutions with others or using solutions provided by others, in part or in whole, is prohibited.*
- *Whenever a question asks you to give an algorithm for a problem, be sure to also prove its correctness and analyze its time complexity.*
- *If you consult an outside resource (e.g., web page, book, or research paper) to arrive at your solution, be sure to cite that resource.*

Suggested reading: Chapter 4 from textbook.

Homework questions:

Question 1. (10 points) Recall the coin changing problem and the cashier's algorithm we studied in class. Suppose we are given coin denominations that are powers of some number c, i.e., the denominations are $c^0, c^1, \ldots, c^k$ for some positive integers $c > 1$ and $k \geq 1$. Prove that the cashier's algorithm will always yield an optimal solution when given such coin denominations. (You do not need to restate cashier's algorithm here and do not need to analyze its time complexity.)

Question 2. (10 points) Exercise 2 from Chapter 4, page 189 of the textbook.

Question 3. (10 points) Exercise 3 from Chapter 4, pages 189-190 of the textbook.

Question 4. (10 points) Exercise 6 from Chapter 4, page 191 of the textbook.

Question 5. (10 points) Given an edge-weighted digraph $G = (V, E)$ with positive edge-lengths and two nodes $u, v \in V$, provide a polynomial-time algorithm to determine if there is a unique (i.e., only one) shortest path from u to v in G.