

COSC 311: ALGORITHMS

MINI 5

Due Friday, October 11 in class

1. Making Change. Consider the following non-standard coin denominations:

1¢ 4¢ 7¢ 12¢

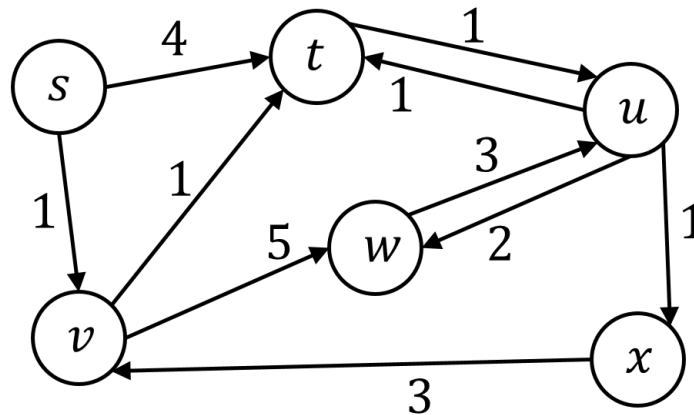
Suppose we are making change for 33¢.

(a) What set of coins will the greedy algorithm output?

(b) Is this optimal? If not, what is the optimal way to make change for 33¢ using this set of coins?

2. Solution structure. What does it mean for a problem to have the optimal substructure property?

3. Shortest Paths. Here's a graph:



Fill in the table to show the execution of Dijkstra's algorithm on this graph to find the shortest path from node s to all other nodes. Each row should show T (the partial spanning tree), and U , the set of nodes that are unvisited (including the best distance found so far from s to all nodes in U). The first row shows, as an example, what T and U look like after only s has been visited.

After iteration	T (partial solution)	U (unvisited nodes)
1	$(\{s\}, \emptyset)$	$(t, 4, s), (u, \infty, \emptyset), (v, 1, s), (w, \infty, \emptyset), (x, \infty, \emptyset)$
2		
3		
4		
5		
6		