CSE 102 Spring 2021
Quiz Reflection 4

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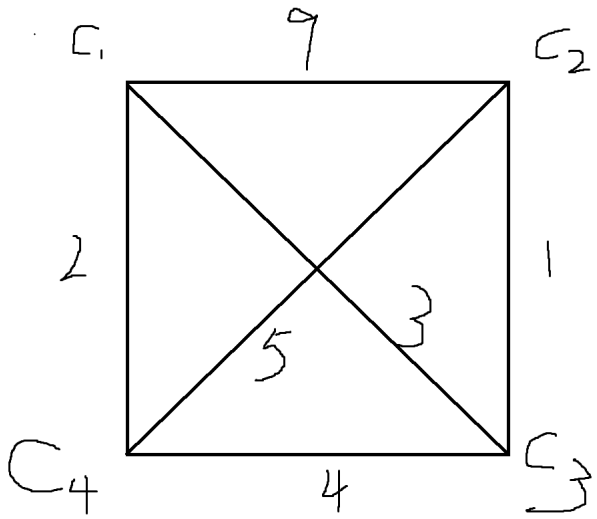
1 Quiz 4

Solution for 1. b): (s,w) will be the shortest path from s to w, however, it will never determine any other shortest path during this step. □

Solution for 4. Here is an counter example.

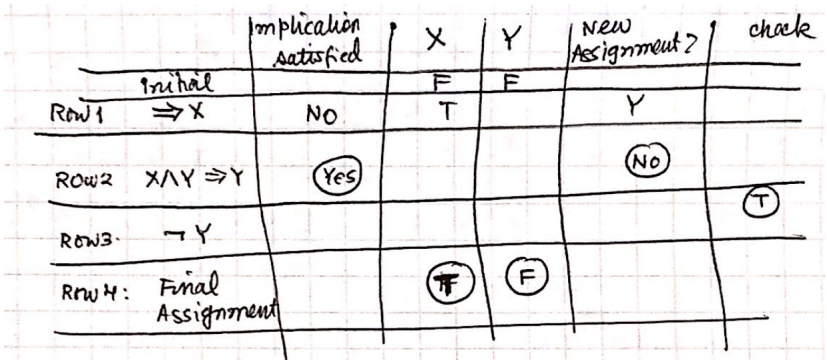


By greedy algorithm: $c_1 \to c_4 \to c_3 \to c_2 \to c_1 = 2+4+1+9 = 16$.
While the optimal solution is: $c_1 \to c_4 \to c_2 \to c_3 \to c_1 = 2+5+1+3 = 11$.

□

Solution for 5. I didn't notice we only need to prove the denomination 1 case, so I only need to provide why g_1 and n_1 is from 0 to 5. The whole proof would be:
Let c=$\{c_1 = 1, c_2 = 5, c_3 = 10, c_4 = 5^2\}$

Suppose we have X=$\{x_1, x_2, x_3, x_4\}$ be the optimal solution.
Let g=$\{g_1, g_2, g_3, g_4\}$ be the solution to our greedy algorithm.
Now we need to prove that $\sum_{i=1}^{4} x_i c_i = \sum_{i=1}^{4} g_i c_i$:
$x_1 + 5x_2 + 10x_3 + 25x_4 = g_1 + 5g_2 + 10g_3 + 25g_4$
reduing the equation by mod 5 yielding $x_1 \equiv g_1 (\text{mod } 5)$.
$0 \leq g_1 < 5$ because greedy algorithm will choose larger denomination if g_1 is larger than or equal than 5 in last selection.
$0 \leq n_1 < 5$ because optimal solution will reduce the amount of n_1. However, if n_1 is larger than 5, it could not be the optimal solution.
Thus $n_1 = g_1$ mod 5, and $n_1 = g_1$. □



Solution for 6.
After X change to true from false, "X and Y" will maintain false. "false→false" statement will maintain true. And all the following result will change as well. Y would stay F, check would be true. □