CSCI 3333 Practice Quiz DP2

Problem 1. Fill in the table in Figure 1 of the minimum number of coins from the set $C = \{1, 5, 6\}$ that sum to the given amount.

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</table>

Figure 1: The table for the first part of Problem 1.

Fill in the table in Figure 2 of the minimum number of coins from the set $C = \{2, 3, 8\}$ that sum to the given amount.

|   | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| 1 |   |   |   |   |   |   |   |   |   |    |    |    |    |    |

Figure 2: The table for the second part of Problem 1.

Problem 2. Fill in the table in Figure 3 of the minimum number of coins from the set $C = \{1, 6, 7\}$ that sum to the given amount.

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Figure 3: The table for the first part of Problem 2.

Fill in the table in Figure 4 of the minimum number of coins from the set $C = \{2, 3, 9\}$ that sum to the given amount.

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</table>

Figure 4: The table for the second part of Problem 2.
Problem 3. Complete the following implementation of a function make_change that decides whether change can be made for \( w \) using coins from a set of denominations \( C \) using dynamic programming.

```cpp
bool make_change(unordered_set<int> &C, int w) {
    bool* T = new bool[w+1];
    for (int i = 0; i < w+1; ++i)
        T[i] = false;

    for (int c : C)
        T[c] = _____;

    for (int sub_w = 1; sub_w <= w; ++sub_w)
        for (int c : C)
        {
            if (sub_w-c _____ 0)
                _____;

            if (T[_____] )
                T[sub_w] = true;
        }

    bool soln = T[w];
    delete[] T;
    return soln;
}
```

For instance, the following tests should pass:

```cpp
unordered_set<int> C{4, 5, 9};
test(!make_change(C, 3));
test(make_change(C, 4));
test(!make_change(C, 6));
test(!make_change(C, 7));
test(make_change(C, 10));
test(make_change(C, 17));
test(make_change(C, 18));
```

Let \( k \) be the size of \( C \).
Assume that iterating through the elements of \( C \) takes \( \Theta(k) \) time total.
The running time of make_change is function of \( k,w \).