1. (40 points) There are \( m \) types of coins available in infinite quantities where the value of each coin is given in the array \( C = [c_0, \cdots, c + m] \). Determine the number of ways of making change for \( n \) units using the given types of coins?

Write an algorithm that takes \( n, m \) and \( C \), and returns number of ways to make change for \( n \) units using any number of coins having the values given in \( C \).

2. (20 points) Given an array \( A = [a_1, \cdots, a_n] \), find the length of the longest subsequence such that all elements of the subsequence are sorted in strictly ascending order. Write the algorithm, and analyze its run-time and space usage.

3. (40 points) Let \( P(n) \) denote number of ways to paranthesize \( n \) matrices. Write its recurrence relation and show it is \( \Omega(4^n / n^{1.5}) \). (To show the \( \Omega \) notation, solve problem 12-4 of CLRS. Show your result for each step of 12-4.)