

Assignment #10: Dynamic Programming

1. Given the Python code below, provide your answer on the following questions.

```
def unknown(input_array):  
  
    n = len(input_array)  
  
    S = [1]*n  
  
    for i in range (1 , n):  
  
        for j in range(0 , i):  
  
            if input_array[i] > input_array[j] and S[i] < S[j] + 1 :  
  
                S[i] = S[j]+1  
  
    return max(S)
```

1.1 What is the output when the input_array is [50, 3, 10, 7, 40, 80]?

1.2 What is the output when the input_array is [9, 8, 7, 6, 5, 4]?

1.3 What is the output when the input_array is [10, 20, 30, 40, 50, 1]?

1.4 What does this code do? and what is the time complexity $O(?)$ of this code?

2. Given the Python code below, provide your answer on the following questions.

```
def lcs(X , Y):
    n, m = len(X) , len(Y)
    L = [[0]* (m+1) for i in range(n+1)]
    for i in range(n):
        for j in range(m):
            if X[i] == Y[j]:
                L[i+1][j+1] = L[i][j]+1
            else:
                L[i+1][j+1] = max(L[i][j+1] , L[i+1][j])
    return L

def unknown2(str1,str2,L):
    S = []
    j, k = len(str1), len(str2)
    while L[j][k] > 0:
        if str1[j-1] == str2[k-1]:
            S.append(str1[j-1])
            j -= 1
            k -= 1
        elif L[j-1][k] >= L[j][k-1]:
            j -= 1
        else:
            k -= 1
    return ''.join(reversed(S))
```

2.1 What is the output after `unknown2('AGGTAB', 'GXTXAYB', lcs('AGGTAB', 'GXTXAYB'))` is called?

2.2 What is the output after `unknown2('BANGKOKISCITYOFANGELS', 'LOSANGELESISCITYOFCARS', lcs('BANGKOKISCITYOFANGELS', 'LOSANGELESISCITYOFCARS'))` is called?

2.3 What does `unknown2` code do? and what is the time complexity $O(?)$ of this code?