Manjula Nannuri

Day 15 and 16 Assignment

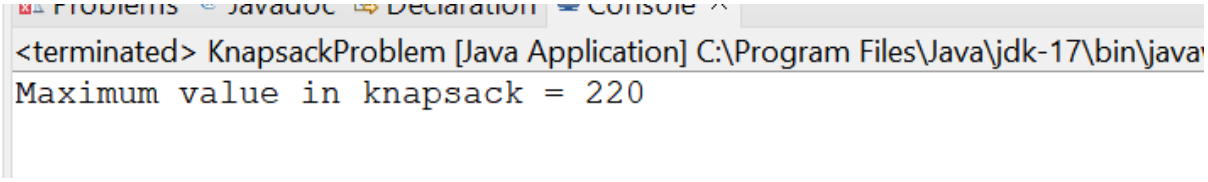
Task 1: Knapsack Problem

Write a function int Knapsack(int W, int[] weights, int[] values) in C# that determines the maximum value of items that can fit into a knapsack with a capacity W. The function should handle up to 100 items. Find the optimal way to fill the knapsack with the given items to achieve the maximum total value. You must consider that you cannot break items, but have to include them whole.

```
package com.example;

public class KnapsackProblem {

public static int Knapsack(int W, int[] weights, int[] values) {

int n = weights.length;

int[][] dp = new int[n + 1][W + 1];

for (int i = 1; i <= n; i++) {

for (int w = 0; w <= W; w++) {

if (weights[i - 1] <= w) {

dp[i][w] = Math.max(dp[i - 1][w], dp[i - 1][w - weights[i - 1]] + values[i - 1]);

} else {

dp[i][w] = dp[i - 1][w];

}

}

}

return dp[n][W];}

public static void main(String[] args) {

int W = 50; // Maximum capacity of knapsack

int[] weights = {10, 20, 30};
```

```
int[] values = {60, 100, 120};

int maxValue = Knapsack(W, weights, values);

System.out.println("Maximum value in knapsack = " + maxValue);

}

}
```

OUTPUT:



Task 2: Longest Common Subsequence

Implement int LCS(string text1, string text2) to find the length of the longest common subsequence between two strings.

```
package com.example;

public class LongestCommonSubsequence {

public static int LCS(String text1, String text2) {

int m = text1.length();

int n = text2.length();

int[][] dp = new int[m + 1][n + 1];

for (int i = 1; i <= m; i++) {

for (int j = 1; j <= n; j++) {

if (text1.charAt(i - 1) == text2.charAt(j - 1)) {

dp[i][j] = dp[i - 1][j - 1] + 1;

} else {

dp[i][j] = Math.max(dp[i - 1][j], dp[i][j - 1]);

}
```

```
}

}

return dp[m][n];

}

public static void main(String[] args) {

String text1 = "abcde";

String text2 = "ace";

int lcsLength = LCS(text1, text2);

System.out.println("Length of the Longest Common Subsequence = " + lcsLength);

}

}
```

OUTPUT:

```
<terminated> LongestCommonSubsequence [Java Application] C:\Program Files\Java\jdk-17
Length of the Longest Common Subsequence = 3
```