United International University (UIU)
Dept. of Computer Science & Engineering (CSE)
CSE 2218 Spring 2023 Final Exam Marks: 15

You have to answer here. No extra page will be provided.

Set A

Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.

Instructions:

- Write the code by yourself. **Do not adopt any unfair means (No help from the internet, any human, or any existing code written by you or any one else is allowed).**
- Submit the code/codes in ELMS.
- Given hints are not the full solution of the problems.
- There are **two** questions. Answer all of them.

Question 1 [7.5]

Write a **dynamic programming solution** for the following scenario:

You want to completely fill a **M** meter long cargo with boxes. There are **N** boxes available: the i-th box has length **L_i**. **Is it possible to completely fill the cargo? If it is, then what are the boxes you picked for that?**
The width is 1 meter and height 1 meter for all boxes and the cargo.

M meter long cargo

L_1 meter long box

....

L_n meter long box

Sample Input **M N** **L_1 ... L_N**	**Sample Output**
15 3 **2 18 9**	**No**
15 5 **1 2 7 5 8**	**Yes** **2 5 8**

Question 2 [7.5]

Write a **greedy solution** for the following scenario:

You have **N** boxes of chocolates. The **i**-th box contains **x_i** chocolates. You can choose any box you like. Before choosing a box you are allowed to make **M** moves. In each move, you can move any number of chocolates from any box j to any box k. **Find out the maximum number of chocolates you can get.**

Hint: Sort the boxes according to the number of chocolates.

Sample Input **N M** **x_1, ..., x_N**	**Sample Output**
5 2 3 3 3 3 3	9
5 2 5 1 4 2 3	12

Example code snippet for sorting:

```
#include <algorithm>
#include <cstdio>
#include <iostream>
using namespace std;
struct Pair
{
    int a, b;
};
bool comp(Pair p1, Pair p2)
{
    return p1.b < p2.b;
}
int main()
{
    /* an array of struct */
    Pair arr[] = {{5, 100}, {3, 9}, {3, 12}, {1, 6}, {5, 5}, {8, 16}};
    int n = sizeof(arr) / sizeof(arr[0]);
    /* sort the array */
    sort(arr, arr + n, comp);
    /* print the array */
    for (int i = 0; i < n; i++)
    {
        printf("a:%d b:%d\n",arr[i].a, arr[i].b);
    }

    return 0;
}
```