COMP 482 Project 4

OBJECTIVE: Implement a program that solves the Knapsack Problem using dynamic programing.

Input Format: The input file will be called input4.txt and be in the same directory as the java and class files. The format of input4.txt will be a standard text file containing whitespace (spaces/tabs/newlines) separated integers. Please note to put a single space between numbers to act as a delimiter (see examples below)!

Output: A single number which represents the maximum value of items you can carry in your knapsack. The values will be given to you from input4.txt

What you need to do: You must use Dynamic Programming to solve the knapsack problem. A submission does not use Dynamic Programing will lose points (also, would be incredibly inefficient at $O(2^n)$ run time). The test cases your program will be run against will be much larger than the ones below.

The input file will be broken down as follows:

50 ← This is the maximum capacity for your bag
60 100 120 ← This is the value of each item (item 1 = 60, item 2 = 100, item 3 = 120)
10 20 30 ← This is the weight of each item (item 1 = 10, item 2 = 20, item 3 = 30)

EXAMPLE #1: Given an input3.txt file of:

```
50
60 100 120
10 20 30
```

Then the output would be:

```
220
```

EXAMPLE #2: Given an input3.txt file of:

```
500
60 100 120
10 20 30
```

Then the output would be:

```
10
```

EXAMPLE#3: Given an input3.txt file of:

```
21 59 98 23 1 5 97
```

Then the output would be:

```
11
```

Project information and Project Submissions:

- Projects will be done **ONLY** in **Java** (No other languages will be accepted)
- Students should begin to work on projects when the project specifications are released.
- Projects will be released as early as possible to students, and you are encouraged to complete the projects as early as possible. Even if a topic has yet to be covered, if students have taken the time to learn the material beforehand, feel free to attempt projects early and submit them early.
- You will be able to submit your project as many times as you wish until the deadline given. (**For a regrade you must submit the project at least 7 days prior to the deadline otherwise there will be no regrade**)
- **Late projects will not be accepted.**

Projects must be submitted as follows:

- You must submit your project to Canvas **ONLY.** Email submissions will not be accepted.
- The file must be submitted in a ".zip" format

- The “.zip” file should be named with your First and Last name with the project number at the end (Example: DinoBiel1.zip)
- If working in visual studio please do not zip the entire project. Only zip the “.java” file (doing this will cost you points!)
- you must use the DEFAULT package, if not sure how to do this, ask the professor.
- Failure to comply with the rules above will result in a major loss of points on the project!

Grading Rubric: When grading your projects I will assign grades based on the following criteria:
- Does the project work according to the specification including reasonable time complexity? – **50%**
- Does the project utilize the concepts requested in the specification? – **30%**
- Is the code provided in the project well formatted? – **10%**
- Does the code contain sufficient and useful comments to explain sections of the code? – **10%**