CS 353 Analysis of Algorithms Fall 2022

Assignment 1

University of Wisconsin - La Crosse

1. Please write Java program to solve the scheduling problem. (5 pts.)

Description:

There are n tasks, and the processing time of each task is known. These tasks are scheduled to be processed on a single machine from time 0. The completion time of each task is from time 0 to the time when the task is processed. What is the schedule with the shortest total completion time (sum of all task completion times)?

Example:

Input(s):

- Task set: [1,2,3,4,5]
- Processing time of each task: [3, 8, 5, 10, 15]

Output:

- The schedule (task array) that minimize the total completion time. [1, 3, 2, 4, 5]

2. Please write Java program to solve investment problem. (5 pts.)

Description:

To invest $n$projects with m dollars in total. The benefit function $f(x)$ represents the benefit of investing x dollars in the i^{th} project, $i = 1, 2, 3, ..., n$. What is the best money distribution plan that can maximize the total benefit?

Example

In total, we have $m = 4$ money to be distributed to $n = 4$ projects. The benefit functions of all four projects are:

x	$f(x_1)$	$f(x_2)$	$f(x_3)$	$f(x_4)$
0	0	0	0	0
1	11	0	2	20
2	12	5	10	21
3	13	10	30	22
4	14	15	32	23
5	15	20	40	24

The best investment is: [1, 0, 3, 1]

Note:

1. Please download the coding template from canvas.
2. Please complete the Java code in "Algorithm.java." Run "Test.java" to test your solution.
3. Test cases can be found in "Test.java".
4. Please follow the submission guideline (on Canvas) to submit the *archived eclipse project*.