CMSC 401 – Fall 2018

Assignment 4
(due Tue, 12/6 – 11:59pm)

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CMSC 401- Algorithm Analysis with Advanced Data Structures

VCU

School of Engineering | Computer Science

Minimum Cost Rod Cutting

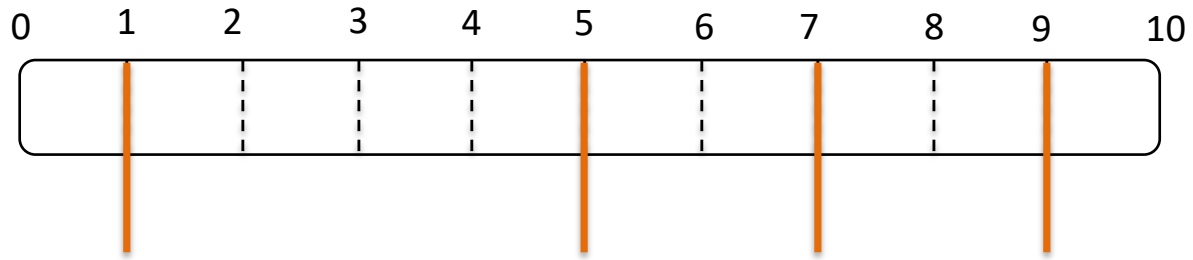
- You are given a rod that is N inches long and a set of M cutting points on the rod.
- You will need to cut the rod from these M points.
- You can perform the cuts in any order of these points.
- After a cut, rod gets divided into two smaller sub-rods.
- The cost of making a cut is the length of the current sub-rod in which you are making a cut.
- Your goal is to minimize the total cost of cutting.
- Output will show only the minimum cost.

Assignment 4

- Write a program cmsc401.java that reads the size of the rod and cutting points in the format below:

- The size of the rod, N, in the first line. N>=2, N<=100
- The number of cutting points, M, in the second line. M>=1, M<=N-1
- The location of each of M distinct cutting points (will be >0 and <N)
  - Only integer values

```
10
4
1
5
7
9
```



Cutting points

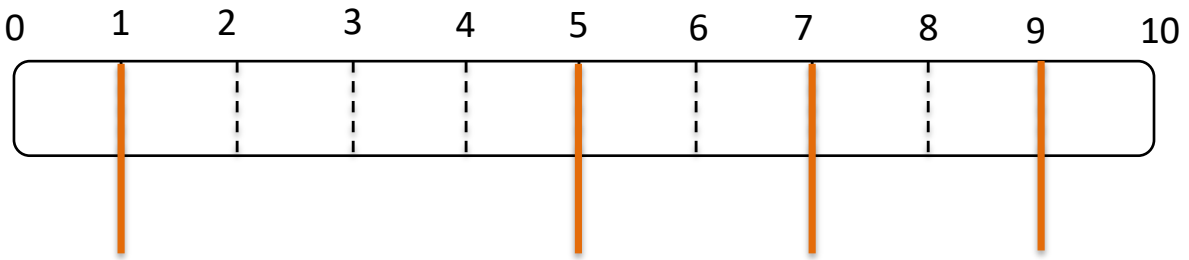
Example

Input in correct format

```
10
4
1
5
7
9
```

Correct output

23



Cutting points

Order	Cost
1) Cutting at 5:	10
2) Cutting at 1:	5
3) Cutting at 7:	5
4) Cutting at 9:	3
Total Cost:	23

An order of cutting points that gives the min cost is 5,1,7,9 (there are also others giving the same minimum)

Hint

- Define the problem in terms of cutting the rod from one point to another one
  - C(i,j) = cost of cutting the rod from point i to point j
- Find the recursive formula
- Apply a dynamic programming method
- Target $O(M^3)$ complexity

Submission

- **Date due:** Thursday, Dec 6th, 11:59 pm
- Upload through Blackboard
  - Your submission should be a zip archive 4_FamilyName_FirstName.zip containing
    - Java source code in a single file cmsc401.java **(all lower case letters!)**
    - The file should have *your name* in a comment in the first line
    - Remember: in Java, class name should match the file name, and is case sensitive
- Please do NOT create your own packages
- Do NOT place the file into a folder – just zip the file
- Use standard I/O to read input (System.in, System.out) and output
- Make sure **the** program compiles and WORKS!
- Late submissions are accepted up to 2 days!