Coding Problems

Stacks and Queues

Problem: Consider you've been given a string. Use a stack to reverse it.

Problem: Consider you've been given a *String* containing curly braces. Write a snippet of code that returns true if there are matching pairs of curly braces. If we can find a closing curly brace for an opening one in the proper order, then we can say that we have a matching pair. For example, a string containing matching pairs looks like this: {{{}}}{}{{}}.
(**Amazon**, **Google**, **Adobe**, **Microsoft**, **Flipkart**)

Problem: Design a stack that computes the minimum value in constant time. The push(), pop(), and min() methods should operate in O(1) time.
(**Amazon**, **Google**, **Adobe**, **Microsoft**, **Flipkart**)

Problem: Consider a stack of *n* plates. If the number of plates is bigger than *n*, then we need to arrange them in a new stack of *n* plates. So, each time the current stack exceeds the *n* capacity, a new stack of that capacity is created. Write a snippet of code that shapes these stacks so that they act as a single stack. In other words, the ***push() and pop()*** methods will work like there is a single stack. Additionally, write a ***popAt(int stackIndex)*** method that pops a value from the stack, as indicated via stackIndex.
(**Amazon**, **Google**, **Adobe**, **Microsoft**, **Flipkart**)

Problem: Design a queue via two stacks.
(**Google**, **Adobe**, **Microsoft**, **Flipkart**)

Problem: Design a stack via two queues.
(**Google**, **Adobe**, **Microsoft**)

Problem: Consider you've been given an array of prices of a single stock for multiple consecutive days. A stock span is represented by the number of consecutive days prior to the current day (today) when the price of a stock was less than or equal to the price of the current day. For example, consider the prices of a stock covering 10 days; that is, {55, 34, 22, 23, 27, 88, 70, 42, 51, 100}. The resulting stock span is {1, 1, 1, 2, 3, 6, 1, 1, 2, 10}. Notice that, for the first day, the stock span is always 1. Write a snippet of code that computes the stock span for the given list of prices.
(**Amazon**, **Google**, **Adobe**, **Microsoft**, **Flipkart**)

Problem: Consider you've been given the histogram shown in the following image:

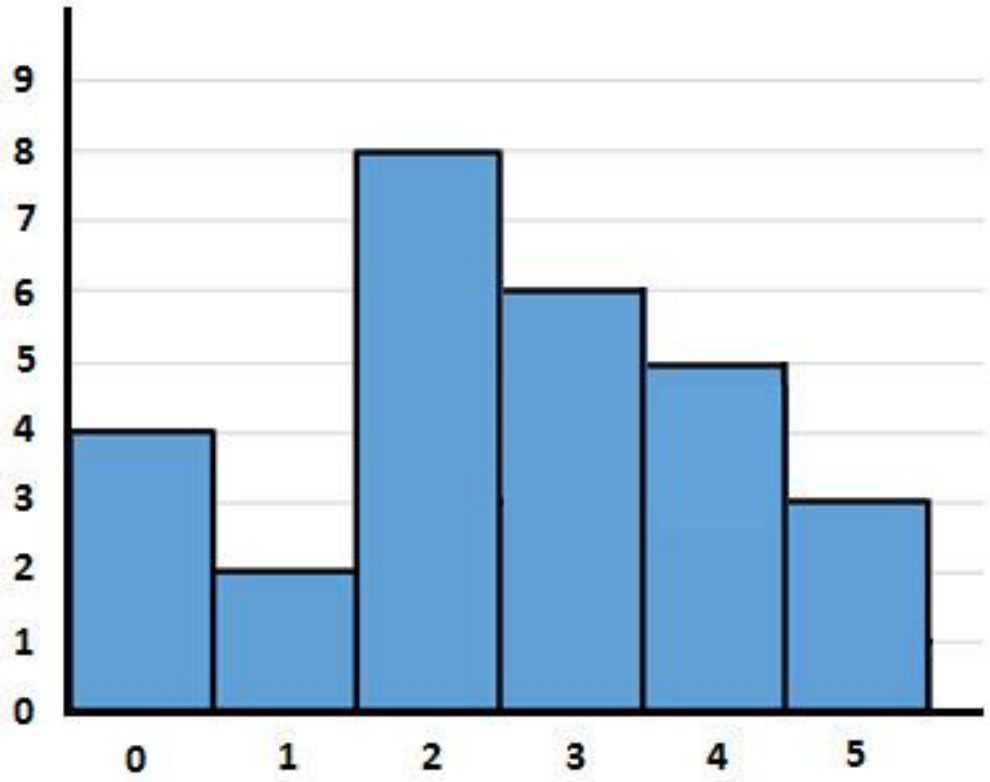

Figure 12.5 – Histogram with the class interval equal to 1

We define a histogram as a diagram of rectangular bars where the area is proportional to the frequency of acertain variable. The width of a bar is known as the histogram class interval. For example, the histogram in the preceding image has a class interval equal to 1. There are six bars whose widths are equal to 1 and whose heights are 4, 2, 8, 6, 5, and 3.

Consider you've been given these heights as an array of integers (this is the input of the problem). Write a snippet of code that uses a stack for computing the largest rectangular area in the histogram. For a better understanding of this, the following image highlights several rectangles (not all) that can be formed:

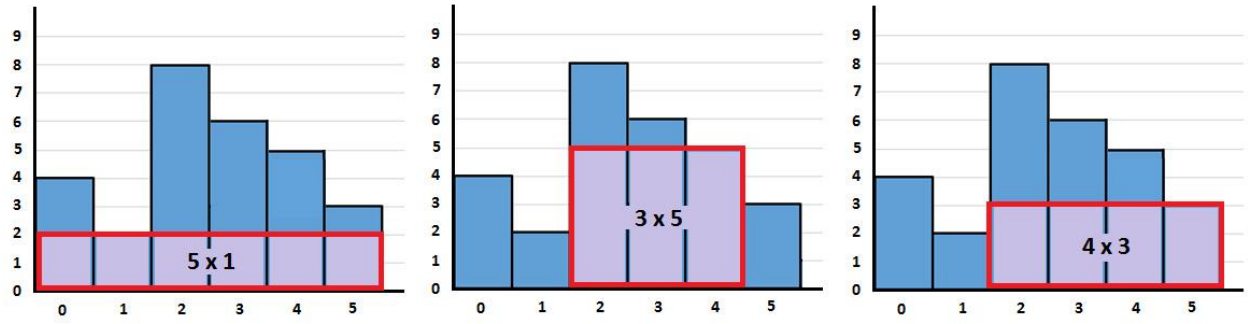

Figure 12.6 – Rectangles of a histogram

In the preceding image, the largest rectangular area (that is, the largest rectangle) is the one in the middle, 3 x 5 = 15.
(**Amazon**, **Google**, **Adobe**, **Microsoft**, **Flipkart**)

Problem: Consider you've been given a matrix, *m*x*n*, containing only 0s and 1s. By convention, 1 means land and 0 means water. Write a snippet of code that counts the number of islands. An island is defined as a group of 1s surrounded by 0s.
(**Amazon**, **Adobe**)

Problem: Consider you've been given a matrix, *m* x *n*, containing only 0s and 1s. By convention, 1 means safe land, while 0 represents unsafe land. More precisely, a 0 represents a sensor that should not be activated. Moreover, all eight adjacent cells can activate the sensor. Write a snippet of code that computes the shortest route from any cells of the first column to any cell of the last column. You can only move one step at a time; either left, right, up, or down. The resulting route (if its exists) should contain only values of 1.
(**Amazon, Google, Adobe**)

Arrays and Strings

Problem: Consider a string that can contain ASCII and Unicode characters ranging between 0-65,535. Write a snippet of code that returns true if this string contains unique characters. The whitespaces can be ignored.
(**Google, Adobe, Microsoft**)

Problem: Consider a string that can contain only characters from *a-z*. Write a snippet of code that returns trueif this string contains unique characters. The whitespaces can be ignored.
(**Google, Adobe, Microsoft**)

Problem: Consider a string given as a char[], *str*. Write a snippet of code that replaces all whitespaces with a sequence, *%20*. The resulting string should be returned as a char[].
Problem: Consider two given strings, *q* and *p*. Write a snippet of code that determines whether we can obtain two identical strings by performing a single edit in *q* or *p*. More precisely, we can insert, remove, or replace a single character in *q* or in *p*, and *q* will become equal to *p*.
(**Google, Microsoft**)

Problem: Consider a given string containing only letters *a-z* and whitespaces. This string contains a lot of consecutive repeated characters. Write a snippet of code that shrinks this string by counting the consecutive repeated characters and creating another string that appends each character and the number of consecutive occurrences. The whitespaces should be copied in the resulting string as they are (don't shrink the whitespaces). If the resulting string is not shorter than the given string, then return the given string.

Problem: Consider a given string containing whitespaces and a-z and 0-9 characters. Write a snippet of code that extracts integers from this string. You can assume that any sequence of consecutive digits forms a valid integer.

Problem: Consider a given string containing any kind of characters, including Unicode characters, that are represented in Java as surrogate pairs. Write a snippet of code that extracts the code points of the surrogate pairs in a list.

Problem: Consider two given strings, str1 and str2. Write a single line of code that tell us whether str2 is a rotation of str1.
(Amazon, Google, Adobe, Microsoft)

Problem: Consider a given *n* x *n* matrix of integers, *M*. Write a snippet of code that rotates this matrix by 90 degrees in a counterclockwise direction without using any extra space.
(Amazon, Google, Adobe, Microsoft, Flipkart)

Problem: Consider a given *n* x *m* matrix of integers, *M*. If *M*(*i*, *j*) is equal to 0, then the entire row, *i*, and column, *j*, should contain only zeros. Write a snippet of code that accomplishes this task without using any extra space.
(**Google, Adobe**)

Problem: Write an implementation of three stacks using a single array. The implementation should expose three methods: push(), pop(), and printStacks().

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(Amazon, Google, Adobe, Microsoft, Flipkart)

Problem: Consider an array of integers (positive and negative), *m*. Write a snippet of code that finds all the pairs of integers whose sum is equal to a given number, *k*.
(Amazon, Adobe, Flipkart)