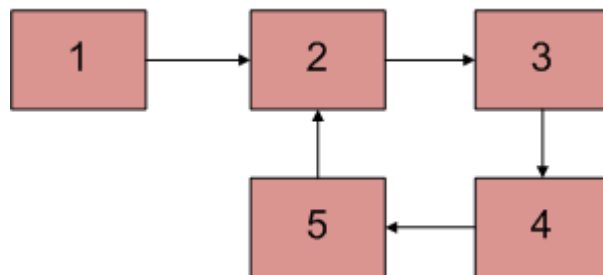# Beginner

1. Rotate a matrix by 90 degree in clockwise direction without using any extra space

2. **Detect loop in a linked list**
   Given a linked list, check if the the linked list has loop or not. Below diagram shows a linked list with a loop.

1. Find the contiguous subarray within an array (containing at least one number) which has the largest sum.
   You are given a read only array of n integers from 1 to n.
   Each integer appears exactly once except A which appears twice and B which is missing.
   Return A and B.
   Note: Your algorithm should have a linear runtime complexity. Could you implement it without using extra memory?
   Note that in your output A should precede B.

2. You have to paint N boards of length {A0, A1, A2, A3 ... AN-1}. There are K painters available and you are also given how much time a painter takes to paint 1 unit of board. You have to get this job done as soon as possible under the constraints that any painter will only paint contiguous sections of board.

3. Evaluate the value of an arithmetic expression in Reverse Polish Notation.
   Valid operators are +, -, *, /. Each operand may be an integer or another expression.

4. Given two words A and B, find the minimum number of steps required to convert A to B. (each operation is counted as 1 step.)
   You have the following 3 operations permitted on a word:
   > Insert a character
   > Delete a character
   > Replace a character

5. There is a rod of length N lying on x-axis with its left end at x = 0 and right end at x = N. Now, there are M weak points on this rod denoted by positive integer values(all less than N) A1, A2, ..., AM. You have to cut rod at all these weak points. You can perform these cuts in any order. After a cut, rod gets divided into two smaller sub-rods. Cost of making a cut is the length of the sub-rod in which you are making a cut.

6. Your aim is to minimise this cost. Return an array denoting the sequence in which you will make cuts. If two different sequences of cuts give same cost, return the lexicographically smallest.

   Notes:
   Sequence a1, a2 ,..., an is lexicographically smaller than b1, b2 ,..., bm, if and only if at the first i where ai and bi differ, ai < bi, or if no such i found, then n < m.
   N can be upto 109.

7. Given a binary tree and a sum, find all root-to-leaf paths where each path's sum equals the given sum.

8. Find the longest increasing subsequence of a given sequence / array.
   In other words, find a subsequence of array in which the subsequence's elements are in strictly increasing order, and in which the subsequence is as long as possible.
   This subsequence is not necessarily contiguous, or unique.
   In this case, we only care about the length of the longest increasing subsequence.

Rookie

1. A hotel manager has to process N advance bookings of rooms for the next season. His hotel has K rooms. Bookings contain an arrival date and a departure date. He wants to find out whether there are enough rooms in the hotel to satisfy the demand. Write a program that solves this problem in time O(N log N) .

   Input:
   First list for arrival time of booking.
   Second list for departure time of booking.
   Third is K which denotes count of rooms.

   Output:
   A boolean which tells whether its possible to make a booking.
   Return 0/1 for C programs.
   O -> No there are not enough rooms for N booking.
   1 -> Yes there are enough rooms for N booking.

2. N number of books are given.
   The ith book has Pi number of pages.
   You have to allocate books to M number of students so that maximum number of pages alloted to a student is minimum. A book will be allocated to exactly one student. Each student has to be allocated at least one book. Allotment should be in contiguous order, for example: A student cannot be allocated book 1 and book 3, skipping book 2.

   NOTE: Return -1 if a valid assignment is not possible

   Input:
   List of Books
   M number of students
   Your function should return an integer corresponding to the minimum number.

3. Given an array S of n integers, find three integers in S such that the sum is closest to a given number, target.
   Return the sum of the three integers.
   Assume that there will only be one solution

4. Given n non-negative integers a1, a2, ..., an,
   where each represents a point at coordinate (i, ai).
   'n' vertical lines are drawn such that the two endpoints of line i is at (i, ai) and (i, 0).

   Find two lines, which together with x-axis forms a container, such that the container contains the most water.

   Note: You may not slant the container.

5. Given an array of non-negative integers, you are initially positioned at the first index of the array.
   Each element in the array represents your maximum jump length at that position.
   Determine if you are able to reach the last index.

6. Implement an iterator over a binary search tree (BST). Your iterator will be initialized with the root node of a BST.
   The first call to next() will return the smallest number in BST. Calling next() again will return the next smallest number in the BST, and so on.

7. Given a string containing just the characters '(' and ')', find the length of the longest valid (well-formed) parentheses substring.
   For "(()", the longest valid parentheses substring is "()", which has length = 2.
   Another example is ")()())", where the longest valid parentheses substring is "()()", which has length = 4.

   NOTE: You only need to implement the given function. Do not read input, instead use the arguments to the function. Do
   not print the output, instead return values as specified. Still have a doubt? Checkout Sample Codes for more details

8. You are given a set of coins S. In how many ways can you make sum N assuming you have infinite amount of each coin in the set.

   **Note :** Coins in set S will be unique. Expected space complexity of this problem is O(N).

9. Say you have an array for which the ith element is the price of a given stock on day i.
   Design an algorithm to find the maximum profit. You may complete as many transactions as you like (ie, buy one and sell one share of the stock multiple times). However, you may not engage in multiple transactions at the same time (ie, you must sell the stock before you buy again).

10. Find the lowest common ancestor in an unordered binary tree given two values in the tree.
    Lowest common ancestor : the lowest common ancestor (LCA) of

Not Pro but More than Rookie

1. Given n non-negative integers representing the histogram's bar height where the width of each bar is 1, find the area of largest rectangle in the histogram.
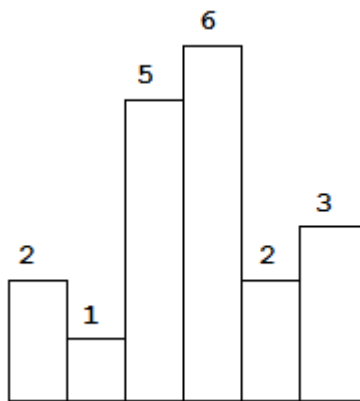
Above is a histogram where width of each bar is 1, given height = [2,1,5,6,2,3].

2. Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it is able to trap after raining.

3. Given a string s and a dictionary of words dict, determine if s can be segmented into a space-separated sequence of one or more dictionary word

4. Given a binary search tree T, where each node contains a positive integer, and an integer K, you have to find whether or not there exist two different nodes A and B such that A.value + B.value = K.
   Return 1 to denote that two such nodes exist. Return 0, otherwise.

Notes:

Your solution should run in linear time and not take memory more than O(height of T).

Assume all values in BST are distinct.

5. Merge two sorted linked lists and return it as a new list.

   The new list should be made by splicing together the nodes of the first two lists, and should also be sorted.