Programming Assessment - ZOOMi Technologies Inc.

Instructions:

Please read these 3 problems and write programs to solve each of them either in a paper (you can take a photo and send) or in a notepad.

- Max time allowed: 1 hour and 30 minutes
- These programs don't need to be compiled and running. Just need a clear logic.
- No restrictions for language syntax, you can use any language you prefer and pseudo code is accepted.
- Don't use any library functions available from specific language frameworks such as sort(), max(), substring(), remove(), etc. But you can use basic programming logic, iteration (loops) and arithmetic operators.
- Please don't copy any code from the internet when answering.
- **Pay attention to the complexity of algorithms** - we value the high performance programs with optimised CPU and memory resource usage

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Q1. Write a method to get the top 2 numbers (maximum number and second maximum) from a given integer array having both positive and negative.
Note: You are not allowed to use any library functions (eg: max(), sort(), etc..)

Inputs - a= array of integers, len = length of array
Output- top 2 integers
Performance hint: Try to achieve this with one iteration (loop)

Q2. Write a method to remove a given number of characters from character array (string) at a given index <mark>without copying to a new string (You can't allocate new array)</mark>
Note: You are not allowed to use any library functions (eg: strremove(), substr(), etc..)
Hint: to terminate string we can add null character ('\0') at the end.

Inputs:
str= character array(string),
len = length of array,
i= starting index,
n= number of characters to remove
Output: same character array (str)
Performance hint: Try to manipulate within same array instead of allocating new arrays
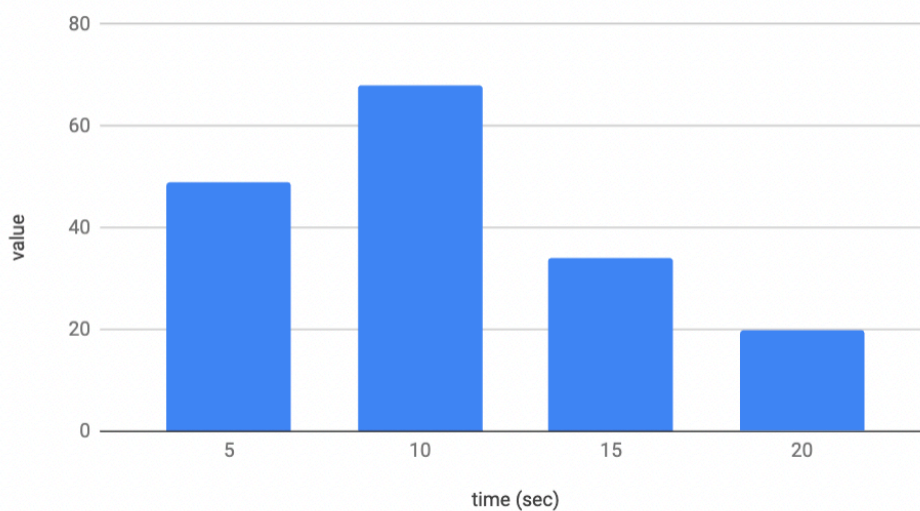Example: if str="abcdefgh" and i=3, n=2 then output should be "abcfgh"

Q3. Write a time-series data sampling algorithm

We have data points per each second and need to sample it based on required frequency (number of points per minute). See below diagram for an example:

value vs. time (Input - per each second)
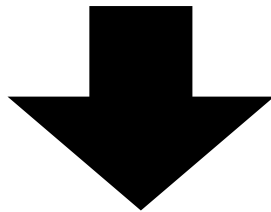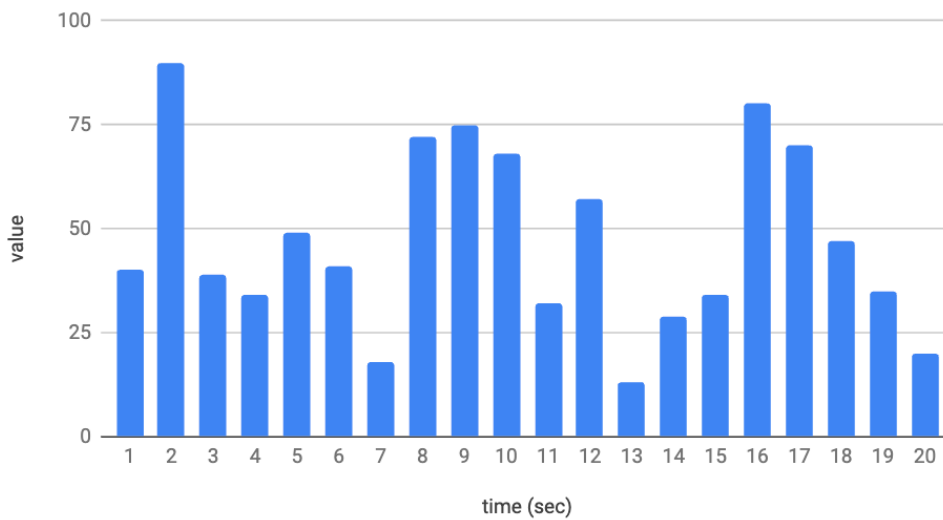
value vs. time (Output - 12 points per minutes)

Your program must determine the selected time values in seconds (always should be integer) that maintains the required frequency at best possible accuracy. In above example, the program must output [5, 10, 15, 20]

Inputs: Required frequency - no of points per minute (f), number of values (n)
Output: Integer array of selected seconds

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