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 an algorithm for a money dispenser machine.

User requests an amount in 10 rupee multiple and the algorithm should give out the notes such a way that larger notes are given as much as possible.

Inputs: arr_notes[] = Available notes as integer array ordered from largest to small (Always the last element is 10)
len = Length of available notes array
amount = Requested amount

Output: Count of each note in an array with same length as arr_notes: arr_out[]
Performance hint: Try to achieve this with one iteration (loop)

Hint: You can use integer division '/' and remainder (i.e. mod) '%' operators. Example: 360 / 100 = 3 and 360 % 100 = 60

Example: If User requests 1650 Rs. and available notes are 1000, 100, 50, 20 and 10, dispenser will give out 1000 X 1 + 100 X 6 + 20 X 2 + 10 X 1.
arr_notes = [1000, 100, 50, 20, 10], len=5, amount = 1650 ==> arr_out = [1, 6, 0, 2, 1]

Q2. Write a method to remove a given number of characters from character array (string) at a given index **without copying to a new string (You can't allocate new array)**

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 an algorithm to keep the output frame rate of video generation program at a given constant value

The video generation program generates images (frames) continuously in an infinite loop as given below. We want to ensure that send_frame() function is called in such a way that the output rate is steady value independent of the processing speed.

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while True:
        img = generate_image()
        send_image(img)
```

Inputs: No of frames per second (FPS)
Available functions you can use in algorithm:
delay_ns(nano_seconds_interval) —> Sleep the program by given no of nano seconds
system_time() —> Get current system time as no of nano seconds relative to some fixed reference time

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