

ICODE – QUALIFYING ROUND

Duration: 2hrs

Problem 1: Cats and a Mouse (3 points)

Two cats and a mouse are at various positions on a line. You will be given their starting positions. Your task is to determine which cat will reach the mouse first, assuming the mouse does not move and the cats travel at equal speed. If the cats arrive at the same time, the mouse will be allowed to move and it will escape while they fight.

You are given q ($1 \leq q \leq 100$) queries in the form of $x y z$ ($1 \leq x, y, z \leq 100$) representing the respective positions for cats A and B, and for mouse C. Complete the function

catAndMouse to return the appropriate answer to each query, which will be printed on a new line.

If cat A catches the mouse first, print **Cat A**.

If cat B catches the mouse first, print **Cat B**.

If both cats reach the mouse at the same time, print **Mouse C** as the two cats fight and mouse escapes.

Input: The first line contains a single integer, q , denoting the number of queries.

Each of the subsequent lines contains three space-separated integers describing the respective values of (cat A's location), (cat B's location), and (mouse C's location).

Output: Either 'Cat A', 'Cat B', or 'Mouse C'

Input	Output
2	Cat B
1 2 3	Mouse C
1 3 2	

Problem 2: Super Reduced String (3 points)

Reduce a string of lowercase characters in range $ascii['a'..'z']$ by doing a series of operations. In each operation, select a pair of adjacent letters that match, and delete them.

Delete as many characters as possible using this method and return the resulting string. If the final string is empty, return *Empty String*.

Example:

'*aab*' shortens to '*b*' in one operation: remove the adjacent '*a*' characters.

Remove the two '*b*' characters leaving '*aa*'. Remove the two '*a*' characters to leave ''.

Return '*Empty String*'.

Input: A single string, s ($1 \leq \text{length of } s \leq 100$).

Output: The reduced string or *Empty String*

Input	Output
aaabccddd	abd
aa	Empty String
baab	Empty String

Problem 3: Bill Division (3 points)

Two friends, Ti and Teo, are deciding how to split the bill at a dinner. Each will only pay for the items they consume. Teo gets the check and calculates Ti's portion. You must determine if his calculation is correct.

For example, assume the bill has the following prices: $bill = [2, 4, 6]$. Ti declines to eat item $k = bill[2]$ which costs 6. If Teo calculates the bill correctly, Ti will pay $(2 + 4) / 2 = 3$. If he includes the cost of $bill[2]$, he will calculate $(2 + 4 + 6) / 2 = 6$. In the second case, he should refund 3 to Ti.

Input: The first line contains two space-separated integers n and k , the number of items ordered and the 0-based index of the item that Ti did not eat.

The second line contains n space-separated integers $bill[i]$ ($0 \leq i < n$).

The third line contains an integer, b , the amount of money that Teo charged Ti for his share of the bill.

Output: If Teo did not overcharge Ti, print *Bon Appetit* on a new line; otherwise, print the difference that Teo must refund to Ti.

Note: The amount of money due Ti will always be an integer.

Input	Output
4 1 3 10 2 9 12	5
4 1 3 10 2 9 7	Bon Appetit

Problem 4: Grid Lines (1 point)

In an $n \times m$ grid with each cell's dimension being 1×1 , there will be $(n+1) \times (m+1)$ cross points. Your task is to count the number of ways (S) of choosing k different points from these cross points such that all of them lie on a straight line and at least one of the cross points lies on the border.

Input: A single line containing 3 integers n, m ($0 < n, m \leq 3000$) & k ($2 \leq k \leq \max(n, m) + 1$) separated by a single space.

Output: A single integer denoting the number of ways (S)

Input	Output
2 2 3	8

— THE END —