Input/output problems

Introduction to Embedded images problems

In such a type of reasoning-based question, you are given a word and number arrangement. With each subsequent operation, the arrangement of the words and numbers changes following a particular pattern. These operations are performed until a final arrangement is reached or is performed in a loop. You are required to identify the hidden pattern in the rearrangement and apply it to the questions.

Types of input-output problems

Ordering
Either the words are arranged alphabetically (forward/ reversed) or numbers are arranged in ascending/ descending order. The arrangement is usually based on the first letter of every word. Sometimes it is based on the last letter of every word. Both words and numbers could be arranged individually or simultaneously in each step. The rearrangement can start from the left or right side of the sentence and sometimes even simultaneously from both ends. The rearrangement could either start with a word or a number etc.

Example: Input: Cat Rail Snow Moon Fear
Step 1: Snow Cat Rail Moon Fear
Step 2: Snow Rail Cat Moon Fear
Step 3: Snow Rail Moon Cat Fear
Step 4: Snow Rail Moon Fear Cat
This is the final arrangement and STEP IV is the last step for this input.
What will be the last step of the following input?
INPUT: Care Steel Brick Nap Bomb Cry
Solution: The given rearrangement has a pattern that can be followed from the input step to the final step, which is Step IV. Observe carefully. The rearrangement follows the following patterns:

- The rearrangement is taking place from left to right.

- The rearrangement is taking place one word at a time.
- The rearrangement is done on the basis of descending alphabetical order based on the first letter of the word.

Mathematical Operations

Some mathematical operations (like squaring the number, adding the digits within the number, some common number added/subtracted/multiplied/divided to each number, etc.) are applied to the numbers in each step.

Example: Input : 26 34 56 78 63 99
Step 1: 20 34 56 78 63 90
Step 2: 20 30 56 78 60 90
Step 3: 20 30 50 70 60 90
Step III is the final step. Explain the operation.

Solution: In this example, the unit's digits of the left-most and right-most numbers are simultaneously being subtracted from the numbers themselves. This is followed by the number to the right of the left-most one, and to the left of the right-most one.

Shifting or interchanging

In this type the positions of characters/alphabets/words etc., in the input changes according to questions, following a particular pattern which repeats itself e.g. 'shift 1st character to last' or 'interchange 1st & last' etc.

Example: A computer rearranges a particular input using some operations 01, 02, 03, and 04.
Input: I am not coming home for dinner
Step 01: dinner not am coming home for I
Step 02: not dinner coming am home I for
Step 03: for coming dinner am home I not
Step 04: coming for am dinner home not IIf
Step 4 gives "I know you will not come back" what step will have "you back I come not will know"
Solution: Since the words remain unchanged here, so this is a case of either

rearrangement or shifting. Let us number each word for our convenience.
I = 1, am = 2, not = 3, coming = 4, home = 5, for = 6, dinner = 7
Input : 1 2 3 4 5 6 7
Step 01: 7 3 2 4 5 6 1
Step 02: 3 7 4 2 5 1 6
Step 03: 6 4 7 2 5 1 3
Step 04: 4 6 2 7 5 3 1
So, the logic being followed is:-
Step 01 = Swap 1st & last; 2nd & 3rd

Step 02 = Swap 1st & 2nd, last two & 3rd and 4th

Step 03 = Swap 1st & last, 2nd & 3rd.

Step 04 = 1st & 2nd, last two, & 3rd and 4th.

Since after two steps, the operation is repeated, hence you can guess the 5th, 6th, 7thsteps.