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**Question 3:**

**Bubble Sort:**

Bubble Sort works by repeatedly swapping the adjacent elements in each row if they are in wrong order. Following steps are taken for sorting a matrix with **r** number of rows and **c** number of columns using **bubble sort**. Steps 1 to 3 are performed for each row of the matrix **row[0]** to **row[r-1]:**

**Step 1**: For i = 0 to **c** -1 repeat Step 2  
**Step 2**: For j = i + 1 to **c** – I repeat **Step 3**  
**Step 3**: if **row**[j] > **row** [i]  
 Swap **row** [j] and **row** [i]  
[End of Inner for loop]  
[End if Outer for loop]  
**Step 4**: Repeat **Step 1** for each row of the matrix

**Insertion Sort:**

  In insertion sort of a matrix, each row is virtually split into a sorted and an unsorted part. Values from the unsorted part are picked and placed at the correct position in the sorted part. Following steps are taken for sorting a matrix with **r** number of rows and **c** number of columns using **insertion sort**. Steps 2 to 5 are performed for each row of the matrix **row[0]** to **row[r-1]:**

**Step 1**: Repeat Steps 2 to 5 for j = 1 to **c**-1  
**Step 2**: set key = **row** [j]  
**Step 3**: set k = j – 1  
**Step 4**: Repeat while key < **row** [k]  
 set **row** [k + 1] = **row** [k]  
 set k = k – 1  
[end of inner loop]  
**Step 5**: set row[k + 1] = key  
[end of loop]  
**Step 6**: Repeat **Step 1** for each row of the matrix

**Selection Sort:**

The selection sort algorithm sorts an each row of a matrix by repeatedly finding the minimum element from unsorted part and putting it at the beginning. The algorithm maintains two subarrays in a given array.

1) The subarray which is already sorted.  
2) Remaining subarray which is unsorted.

In every iteration of selection sort, the minimum element (considering ascending order) from the unsorted subarray is picked and moved to the sorted subarray. Following steps are taken for sorting a matrix with **r** number of rows and **c** number of columns using **Selection sort**. Steps 2 to 3 are performed for each row of the matrix **row[0]** to **row[r-1]:**

**Step 1**: Repeat Steps 2 and 3 for j = 1 to **c**-1  
**Step 2**:set smallestElem = A[j]

set POS = j

for k = j+1 to **c** -1,repeat  
 if smallestElem > A [k]  
 set smallestElem = A [k]  
 set POS = k  
 [if end]  
 [End of loop]

**Step 3**: Swap **row**[j] with **row** [POS]  
[End of loop]  
**Step 4**: Repeat **Step 1** for each row of the matrix