Question 1: Multiple choice questions [5 points]

1) Data structure is _____.
   a) a systematic way to organize data so that it can be used efficiently.
   b) a list of a finite number (n) of similar data.
   c) a linear collection of data elements, called nodes.
   d) All of the above.

2) How can we describe an array in the best possible way?
   a) The Array shows a hierarchical structure.
   b) Arrays are unchangeable.
   c) The Array is not a data structure
   d) Container that stores the elements of similar types

3) Which of the following is a logical data structure?
   a) Array
   b) Linked list
   c) Stack
   d) None of the above

4) A pointer is _____.
   a) A linear collection of data elements, called nodes.
   b) A variable which contains the address in memory of another variable.
   c) A systematic way to organize data so that it can be used efficiently.
   d) None of the above.

5) Which of the following is a linear data structure?
   a) Stack
   b) Queue
   c) Queue
   d) All of the above

Question 2: Answer the following questions as TRUE or FALSE [3 points]

1. [F] The Array is not a suitable data structure to store much data.
2. [T] In data structures, the Sort operation arranges all data items in order.
3. [F] Execution time is a factor in choosing an appropriate data structure.

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Course: Data Structures / CS214
Third Semester 1444/1445

Mark 14/20

Mid. Exam
Duration: 50 min.
Thu. 04/05/2023

اسم الطالب

Question 1: Multiple choice questions **[5 points]**

1) Which of the following is a linear data structure?
   a) Stack
   b) Tree
   c) Queue
   d) None of the above

2) How can we describe an array in the best possible way?
   a) The Array shows a hierarchical structure.
   b) Arrays are unchangeable.
   c) Container that stores the elements of similar types
   e) The Array is not a data structure

3) A pointer is _____.
   a) A linear collection of data elements, called nodes.
   b) A systematic way to organize data so that it can be used efficiently.
   c) A variable which contains the address in memory of another variable.
   d) None of the above.

4) Data structure is _____.
   a) a systematic way to organize data so that it can be used efficiently.
   b) a list of a finite number (n) of similar data.
   c) a linear collection of data elements, called nodes.
   d) All of the above.

5) Which of the following is logical data structure?
   a) Array
   b) Stack
   c) Linked list
   d) None of the above

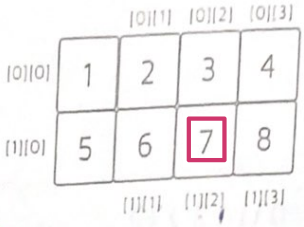
Question 2: Answer the following questions as TRUE or FALSE **[3 points]**

1. [T] The Array is not a suitable data structure to store much data.
2. [T] In data structures, the Sort operation arranges all data items in order.
3. [F] Execution time is a factor in choosing an appropriate data structure.

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Question 3: Calculate the memory address of the element 7 in the following array using Column Major Arrangement. Assume the base address is 100, and the word size is 2. **[2 points]**



2 x 4
M N

i = 1
j = 2

(Loc(i)+(j)) = base_address + w(M x j + i)
= 100 + 2(2 x 2 + 1)
= 100 + 2(5)
= 110

Question 4: Complete a function code to add the elements of two matrices. **[2 points]**

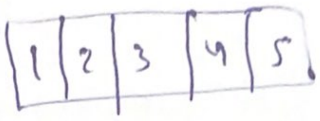
```
void matrix:: matadd (matrix &m1, matrix &m2)
{
      int mat[3][3];
      for (int i = 0; i < 3; i++)
      {
        for(int j=0; j<3; j++){
          mat[i][j] = m1.mat[i][j] + m2.mat[i][j];}
      }
}
```

Question 5: Write a function code to display all elements in the array, if the array size is 8. **[2 points]**

```
void display() {
for(int i=0; i<8; i++){
  cout<<endl;
cout<<arr[i]<<"\t";
    }
}
```

Question 6: Write function code to delete one element from the array, if the array size is 5. **[3 points]**

```
void del(int Pos) {
for(int i = Pos; i<5; i++) {
arr[i-1] = arr[i];
}
arr[i-1] = 0;
}
```



Question 7: Write a function code to interchange the rows with corresponding columns of a matrix with size 4x4. **[3 points]**

```
void transPose(
Void matrix::transPose(matrix &m) {
int mat[4][4]
for(int i=0; i<4; i++){
for(int j=0; j<4; j++){
mat[i][j] = m.mat[j][i]; }
}
}
```

Good Luck!