



Computers Engineering @ AI Dept.
Data Structures
(Arrays)
Sheet 02



2D Arrays Practice Exercises

1. For the following piece of code

```
int ticketInfo[][3] = {{25,20,25}, {25,20,25}};  
String seatingInfo[][2] = {"Jamal", "Maria"}, {"Jake", "Suzy"},  
{"Emma", "Luke"};
```

a) What is the value at `seatingInfo[2][1]`?

b) `int value = ticketInfo[1][0];`
what is the value of `value`?

c) `String name = seatingInfo[0][1];`
What is the value of `name`?

2. Given `int a[][] = {{2, 4, 6, 8}, {1, 2, 3, 4}};`

a) What instruction should you type to print the value at the second row and third column in `a`?

3. Rearrange the following lines of code to find the largest value in a 2D array.

```
(1)    return largest;  
(2)    } // end column loop  
(3)    int largest = arr[0][0];  
(4)    if(arr[r][c] > largest) {  
(5)        for(int r = 0; r < rows; r++){  
(6)            } // end row loop  
(7)        } // end if  
(8)    int getLargest(int arr[][3], int rows) {  
(9)        for(int c = 0; c < 3; c++){  
(10)            } // end method  
(11)    largest = arr[r][c];
```

4. what is the value of `sum` after this code executes?

```
int matrix[][4] = {{1,1,2,2},{1,2,2,4},{1,2,3,4},{1,4,1,2}};  
int sum = 0;  
int col = 2;  
for (int row = 0; row < 4; row++)  
    sum = sum + matrix[row][col];
```

5. What are the contents of `arr` after the following code has been executed?

```
int arr[][3] = {{3,2,1},{1,2,3}};  
int value = 0;  
for (int row = 1; row < 2; row++) { for (int col =  
    1; col < 2; col++) {  
        value = arr[row][col];  
        if (value % 2 == 1) {arr[row][col] = value + 1;}  
        if (arr[row][col] % 2 == 0) {arr[row][col] = value * 2;}  
    }  
}
```

Programming Projects

Writing programs to solve the Programming Projects helps to solidify your understanding of the material and demonstrates how the concepts are applied.

1. Write a program, using a function called `getMaxNum` that returns the value of the highest number in 1D array.
2. Modify the function in Programming Project 1 so that the item with the highest numeric value is not only returned by the function but also removed from the array. Call the function `deleteMaxNum`.
3. The `deleteMaxNum` function in Programming Project 2, suggests a way to create an array of numbers sorted by numeric value.
4. Write a `removeDupes` function that removes any duplicate entries in the array. That is, if three items with the value 'aa' appear in the array, `removeDupes` should remove two of them. Don't worry about maintaining the order of the items.

Hint: One approach is to make a new, empty list, move items one at a time into it after first checking that they are not already in the new list, and then set the array to be the new list. Of course, the array size will be reduced if any duplicate entries exist. Write some tests to show it works on arrays with and without duplicate values.

5. Assume you have two ordered arrays of random numbers. Write a function `merge` so that you can merge those two ordered arrays into one. Your solution may create a new a big enough array to hold the contents of the two arrays. Write tests for your implementation that creates two arrays, inserts some random numbers into them, invokes `merge` to add the contents of one to the other, and displays the contents of the resulting array. The source arrays may hold different numbers of data items. Your algorithm needs to compare the keys of the source arrays, picking the smallest one to copy to the destination. You also need to handle the situation when one source array exhausts its contents before the other.