

1. The following sequence creates a 2-dimensional array of ints and fills it with data. In the space below fill in the correct values that will be in the array after the program runs.

```
{int[,] a = {{2,3,4}, {9,8,7}};  
int r, c;  
for(r=0;r<2;r++)  
{for(c=0;c<3;c++)  
{if(a[r,c] == 1)  
a[r,c] = 0;  
else  
a[r,c] = 1 + r*r + c*c;  
}  
}  
}
```


2. Show what is printed by the following program:

```
int [] c = {9, 8, 7, 6, 5, 4, 3, 2, 1, 0};  
Console.WriteLine("The value is {0}", c[c[c[4]]]);
```

3. How many integers are created by the following declaration:

```
int [,] a3 = new int [9, 2, 3];
```

4. Write an equivalent *while* loop for the following *for* loop.

```
int i;  
for(i=-4;i<20;i=i+3)  
{Console.WriteLine(i-1);  
if(i > 5)  
Console.WriteLine(i+1);  
}
```

5. Write a single statement to create a 2 dimensional array of ints with 2 columns and 3 rows where all of the elements in the array are initialized to the value 5.

6. Show how to use the Random class to create a random variable name r. Use r to assign an int named x to a random number ranging from -4 to +14.

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7. How many lines of print are written by the following sequence:

```
int [,] a = {{1, 2, 3}, {4, 5, 6}, {7,8,9}};  
foreach(int x in a)  
Console.WriteLine(x);
```

Number of lines printed: _____

8. Write a method which will return the index of the largest item in an integer array named aData. The size of aData is unknown. A sample calling statement is given as:
`Console.WriteLine(IndexOfLargest(aData));`

9. Write a method which will receive a two dimensional array of integers along with a row number. Your method should return the average value of the row at the row number. A sample calling statement is given as:
`Console.WriteLine(RowAverage(a, 2); //Prints the average of the values in row 2.`
It is not necessary to check if the row is a valid row.

10. Write a method which will place the items in an integer array in reverse order. For example if the array had the data {1, 2, 3, 4, 5} your method would change the array so that the data was {5, 4, 3, 2, 1}. A sample calling statement is given as:
`Reverse(a); //Reverse the items in a`

11. Write a method which returns the number of times a specified number appears in an array.

For example,

```
int a[6] = {4, 8, 4, 5, 7, 4};  
Console.WriteLine(Count(a, 4));
```

will return 3 since 4 appears 3 times in the array. The method is started for you below.

12. The following method does a *Select sort* on a parameter named *arr*. Line numbers have been added to the left for reference purposes. Answer the questions below with regard to this method.

```
1 private static void SelectSort(int [] arr)
2 {int i, j, tmp, minIndx;
3   for(i=0;i<arr.Length-1;i++)
4     {for(j=i;j<arr.Length;j++)
5       {FindMin(arr, i, out minIndx);
6         tmp = arr[i];
7         arr[i] = arr[minIndx];
8         arr[minIndx] = tmp;
9       }
10    }
11 }
12 private void FindMin(int [] data, int start, out int minIndx)
13 {int i;
14   minIndx = start;
15   for(i=start;i<data.Length;i++)
16     {if(data[i] < data[minIndx])
17       minIndx = i;
18     }
19 }
```

A) What do lines 6, 7, and 8 do?

B) What is the minimum number of times that the for loop beginning in line 3 will run if the array being sorted has 15 elements and is already in sorted order.

C) If *arr* has just 3 elements what is the maximum number of times the for loop beginning in line 3 will run. Justify and explain your answer.

D) What is the purpose of the *start* variable in the *FindMin* method?

E) If a main program has an array of ints created by

```
int [] mArr = new int[1024];
```

and the array has been filled with data, show how to sort this array using the Sort method above.