Recursion Day 2

APCS MC Practice

6. The following method will return true, if and only if: _____

(A) s contains two or more of the same characters
(B) s contains two or more of the same characters in a row
(C) s starts with two or more of the same characters
(D) s ends with two or more of the same characters
(E) s.charAt(0) == s.charAt(1)

```
public boolean check (String s)
{
    return s.length ( )  >= 2 && (s.charAt(0) == s.charAt(1)
|| check(s.substring(1)));
}
```

9. The procedure call `mystery(38)` will yield as output which of the following sequences of numbers? _____

(A) 0 12
(B) 12 0
(C) 1 1 0 2
(D) 1 1 1 1
(E) 2 0 1 1

```
public void mystery (int n)
{
    if (n>2)
      mystery (n % 3);
    System.out.print( (n / 3) + " " );
}
```

10. Given the input line ABCD and 0, what does the following method print? _____

(A) ABCDCBA
(B) ABBCCCDDDD
(C) ABBCCCDDDDDDDDCCCBBA
(D) AABABCABCDABCDABCABA
(E) ABBCCCDDDDDDDDCCCCBBBBAAAA

```
public void processLine(String str, int pos)
//precondition: str = "ABCD", pos=0
{
    if (pos < str.length)
    {
       int i;
       for (i=0; i<=pos; i++)
          System.out.print(str.substring(pos, pos+1) );
       processLine(str, pos + 1);
       for (i=0; i<=pos; i++)
          System.out.print( str.substring(pos, pos+1) );
    }
}
```

15. Assume the array contains: { 2, 4, 6 } and that the call to the sum method is: `sum( arr, 3 )`. What value is returned? _____

```
int sum( int arr[], int n )
{
   if ( n == 0 )
      return 0;
   else
  {
      int smallResult = sum( arr, n - 1 );
      return smallResult + arr[ n - 1 ];
  }
}
```

17. For each call to the following method, indicate what value is returned.

```
public void mystery6(int x, int y)
{
   if (y == 1)
   {
      System.out.print(x);
   }
   else
   {
      System.out.print(x * y + ", ");
      mystery6(x, y - 1);
      System.out.print(", " + x * y);
   }
}
```

`mystery6(4,1)` _____ `mystery6(8,2)` _____

`mystery6(3,4)` _____

20. For each call to the following method, indicate what console output is produced.

```
public void mystery9(int x)
{
   if (x < 10)
   {
      System.out.print(x);
   }
   else
   {
      int y = x % 10;
      System.out.print(y);
      mystery9(x / 10);
      System.out.print(y);
   }
}
```

mystery9(7) _____

mystery9(38) _____

mystery9(194) _____

21. What is displayed when the following method is called with an '*' _____

```
public static void splat (String s)
{
    if (s.length()<8)
       splat(s+s)
    System.out.println(s);
}
```

(A) **
(B) ****
(C) ********
(D) ********
    **
(E) ********
    ****
    **
    *

22. Lexi is a cheerleader and a programmer. She has written the following recursive method that is supposed to generate the cheer "2 4 6 8 who do we appreciate!": _____

```
public void cheer (int i)
{
    if (i != 8)                                          //line 1
    {                                                    //line 2
       i = i +2;                                         //line 3
       cheer(i);                                         //line 4
       System.out.print(i + " ");                        //line 5
    }                                                    //line 6
    else                                                 //line 7
    {                                                    //line 8
       System.out.print ("who do we appreciate!");       //line 9
    }                                                    //line 10
}
```

However, Lexi's method doesn't work as expected when she calls `cheer(0)`. To get the right cheer, Lexi should

(A) replace `if (i !=8)` with `if (i<=8)` on line 1
(B) replace `if (i !=8)` with `if (i==8)` on line 1
(C) replace `if (i !=8)` with `while (i!=8)` on line 1
(D) swap line 4 and line 5
(E) move line 3 after line 5

25. Given `int[]a = {1, 3, 4, 7, 9, 11, 13);`

What are the values in `a` after `disarray(a,7)` is called? The method `disarray` is defined as follows:

```
public void disarray(int[] a, int n)
{
  if(n > 1)
  {
     disarray(a, n - 1);
     a[n - 1] += a[n - 2];
  }
}
```

(A) 1, 4, 8, 15, 24, 35, 48
(B) 1, 4, 8, 12, 16, 20, 24
(C) 1, 24, 20, 16, 12, 8, 4
(D) None of the above

27. Consider the following recursive method: _____

```
public int tricky( int x, int y)
{
     if (y == 2)
          return x;
     else
          return tricky(x,y-1) + x;
}
```

What is output by `tricky(7,3)`?

28. Consider the following recursive method: _____

```
public int mystery (int a, int b)
{
     if (a < b)
          return 5;
     else
          return b + mystery (a-1, b+1);
}
```

What does mystery (7,3) evaluate to?

29. Consider the following recursive method: _____

```
public static void printString (String s)
{
     if (s.length()>0)
     {
          printString(s.substring(1));
          System.out.println(s.substring(0,1));
     }
}
```

What is the output as a result of the call `printString("stressed")`?

32. Consider the following recursive method:

```
public static void printArray(String[]a, int k)
{
     if (k < a.length)
     {
          printArray (a, k+1);
          System.out.print(a[k]);
     }
}
```

Assume that array a has been initialized to be of length 4 and to contain the values "a", "b", "c", and "d" (with "a" in a[0], "b" in a[1], and so on.) What is the output as a result of the call `printArray (a, 0)`?

(A) bcd
(B) dcb
(C) abcd
(D) dddd
(E) dcba

39. Consider the following method:

```
public int getSomething(int value)
{
   if(value < 2)
      return 0;
   else
      return 1 + getSomething(value - 2);
}
```

Assume `val` > 0. What is returned by the call `getSomething(val)`?

(A) `val - 2`
(B) `val % 2`
(C) `(val-1) % 2`
(D) `val / 2`
(E) `(val-1) / 2`

41. Consider the following method:

```
public void change(int value)
{
   if(value < 5)
      System.out.print("" + value % 5);
   else
   {
      System.out.print("" + value % 5);
      change(value/5);
   }
}
```

What will be printed as a result of the call `change(29)`?

(A) 1
(B) 4
(C) 14
(D) 104
(E) 401

43. Consider the following method:

```
public void doSomething(int value)
{
    if(0 < value && value < 10)
    {
        doSomething(value - 1);
        doSomething(value + 1);
        System.out.print(" " + value);
    }
}
```

Which of the following will be printed as a result of the call `doSomething(4)`?

(A) 4 3 2 1 5 6 7 8 9
(B) 4 3 5 2 6 1 7 8 9
(C) 9 8 7 6 5 1 2 3 4
(D) 9 8 7 1 6 2 5 3 4
(E) Nothing will be printed due to an infinite recursion

45. Consider the following data field and method:

```
private int[] list;

public int getIt(int index)
{
    if(index == list.length - 1)
        return list[index];
    else
    {
        int target = getIt(index + 1);
        if(target < list[index])
          return target;
        else
          return list[index];
    }
}
```

What will be returned by the call `getIt(0)`?

(A) The smallest value in `list`
(B) The index of the smallest value in `list`
(C) The largest value in `list`
. (D) The index of the largest value in `list`
(E) The index of the first occurrence of target in `list`

51. What is the output by the call `fun (3,6)`?

```
public int fun (int x, int y)
{
    if (y==2)
      return x;
    else
      return fun (x, y-1) + x;
}
```

(A) 3 3 3 3 3
(B) 12
(C) 18
(D) 15
(E) 243

55. Consider the recursive method `minVal` that is intended to return the smallest value among the first `n` values in array a.

```
public static int minVal (int []a, n)
{
     if (n==1)
          return <missing code 1>;
     int min = minVal (a, n-1);
     if (min < a[n-1])
          return <missing code 2>;
     else
          return <missing code 3>;
}
```

Which of the following should be used to complete the three return statements?

	<missing code 1>	*<missing code 2>*	*<missing code 3>*
(A)	a[0]	min	a[n]
(B)	a[0]	a[n]	min
(C)	a[1]	a[min]	a[n-1]
(D)	a[1]	a[min]	a[min-1]
(E)	a[0]	min	a[n-1]