Day 1 Recursion Practice

```
public int f1 (int a)
{
   if (a <= 1){ return a; }
   else { return a + something (a - 2); }
}
```

F1(1) =

F1(4) =

F1(8) =

```
public int f2 (int a)
{
   if (a == 0) { return; }
   else {
      System.out.println(a);
      f2(a-1);
   {
}
```

f2(5) =

```
public int f3 (int a)
{
   if (a == 0) { return; }
   else {
      f3(a-1);
      System.out.println(a);
   {
}
```

f3(5) =

8. What value is returned by the call `something(4,6)`? _____

(A) 4
(B) 6
(C) 24
(D) 1296
(E) 4096

```
public int something (int a, int b)
{
    if (b <= 1)
    {
       return a;
    }
    else
    {
       return something (a, b-1);
    }
}
```

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

```
public int mystery1(int x, int y)
{
    if (x < y)
    {
       return x;
    }
    else
    {
       return mystery1(x - y, y);
    }
}
```

`mystery1(6,13)` _____

`mystery1(8,2)` _____

`mystery1(14,10)` _____

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

```
public int mystery3(int n)
{
   if (n < 0)
   {
      return -mystery3(-n);
   }
   else if (n < 10)
   {
      return n;
   }
   else
   {
      return mystery3(n / 10 + n % 10);
   }
}
```

mystery3(6) _____

mystery3(17) _____

mystery3(-479) _____

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

```
public int mystery4(int n)
{
   if (n < 0)
   {
      return mystery4(-n);
   }
   else if (n < 10)
   {
      return n;
   }
   else
   {
      return n % 10 + mystery4(n / 10);
   }
}
```

mystery4(8) _____

mystery4(-52) _____

```
mystery4(3052)   _____
```

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

```
public void mystery8(int n)
{
   if (n > 100)
   {
      System.out.print(n);
   }
   else
   {
      mystery8(2 * n);
      System.out.print(", " + n);
   }
}
```

```
mystery8(113)   _____

mystery8(70)    _____

mystery8(42)    _____
```

30. Consider the following recursive method: _____

```
public static void printStars (int k)
{
     if (k>0)
     {
          printStars(k-1);
          for (int j=1; j<=k; j++)
               System.out.print("*");
          System.out.println();
     }
}
```

What is the output as a result of the call `printStars(4)`?

(A)
```
****
***
**
*
```

(B)
```
*
**
***
```

(D)
```
*
**
***
```

(E)
```
*
*
*
```

```
****                    *
```

(C)
```
***
**
*
```

31. Consider the following recursive method:

```
public int mystery (int k)
{
     if (k == 1)
          return 0;
     else
          return (1 + mystery (k/2);
}
```

What value is returned by the call `mystery(16)`?

(A) 0
(B) 2
(C) 4
(D) 5
(E) 16

33. Questions 33 and 34 refer to the following recursive method:

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

What is returned by the call `compute(1,5)`?

(A) 1
(B) 2
(C) 3
(D) 4
(E) No value is returned because infinite recursion occurs.

34. Which of the following calls leads to an infinite recursion?

I. `compute(2,8)`
II. `compute (8,2)`

III. `compute (2,5)`

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

36. Consider the following method:

```
public void mystery (int a, int b)
{
    System.out.print (a + " ");
    if (a <= b)
        mystery (a  + 5, b -1);
}
```

What is the output when mystery (0, 16) is called?

(A) 0
(B) 0 5
(C) 0 5 10
(D) 0 5 10 15
(E) 0 5 10 15 20

37. What is the output when `smile(4)` is called?

```
public static void smile (int n)
{
    if (n==0)
        return;

    for (int k=1; k<=n; k++)
        System.out.print("smile!");
    smile(n-1);
}
```

(A) `smile!`
(B) `smile!smile!`
(C) `smile!smile!smile!`
(D) `smile!smile!smile!smile!`
(E) `smile!smile!smile!smile!smile!smile!smile!smile!smile!smile!`

42. Consider the following method:

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

What is returned by the call `getSomething(4)`?

(A) 0
(B) 1
(C) 2
(D) 5
(E) 7

44. What is the output by the call `fun (3)`?

```
public void fun (int x)
{
    if (x>=1)
    {
        System.out.print(x);
        fun (x-1);
    }
}
```

(A) 3 2 1
(B) 1 2 3
(C) 2 3
(D) 3 2 1 0
(E) Nothing will be printed due to an infinite recursion

49. What is the output by the call `fun (3)`?

```
public void fun (int x)
{
    if (x<1)
    {
       System.out.print(x);
    }
    else
```

```
    {
       System.out.print(x);
       fun (x-1);
    }
}
```

(A) 3 2 1 0 3 2 1 0
(B) 3 2 1 0
(C) 3 2 1 0 0 1 2 3
(D) 0 1 2 3
(E) Nothing will be printed due to infinite recursion

56. Consider the following method:

```
//precondition:  num>=0

public static void mystery (int num)
{
    if (num >1)
        mystery (num/2);
    System.out.print(num%2);
}
```

What is the best postcondition for `mystery`?

(A) Reverses the digits of `num`
(B) Prints the remainder when `num` is divided by 2
(C) Prints one-half `num`
(D) Prints the square root of `num`.
(E) Prints the binary representation of `num`.