

Recursion Worksheet

Show the output of each block of code below.

<p>1. What is returned by the call fun1(3) ?</p> <pre>int fun1(int x) { if (x<1) return x; else return x + fun1(x-1); }</pre>	<p>2. What is output by the call fun2(3) ?</p> <pre>void fun2(int x) { if(x<1) System.out.println("\nDONE"); else { System.out.print(x); fun2(x-1); } }</pre>
<p>3. What is output by the fun3(4) ?</p> <pre>void fun3(int x) { if(x<1) System.out.println("OUTPUT: "); else { fun3(x-1); System.out.print(x); } }</pre>	<p>4. What is returned by the call fun4(3,6) ?</p> <p>5. What is returned by the call fun4(4,2) ?</p> <pre>int fun4(int x, int y) { if(y == 2) return x; else return fun4(x, y - 1) + x; }</pre>
<p>6. What is output by the call fun5(4) ?</p> <pre>void fun5(int x) { if(x<1) System.out.print("\n----\n"); else { System.out.print(x); fun5(x-1); System.out.print(x); } }</pre>	<p>7. What is returned by fun6(8) ?</p> <pre>int fun6(int x) { if (x<1) return x; else return x + fun6(x-2); }</pre>
<p>8. What is returned by fun7(7,2) ?</p> <p>9. What is returned by fun7(5,5) ?</p> <pre>int fun7(int x, int y) { if(y == 2) return y; else return fun7(x, y - 1) + x; }</pre>	<p>10. What is returned by fun8(2,8) ?</p> <pre>int fun8(int x, int y) { if(x<=1) return y; else return fun8(x-1,y-1) + y; }</pre>
<p>11. What is returned by go(5) ?</p> <p>12. What is returned by go(3) ?</p> <pre>int go(int x) { if(x<1) return 1; else return x + go(x-2) + go(x-3); }</pre>	<p>13. What is returned by fly(5) ?</p> <pre>int fly(int x) { if(x<1) return 1; else return x + fly(x-4) + fly(x-1); }</pre>

<p>14. What is returned by boogie(5,10)?</p> <pre>int boogie(int x, int y) { if(y<2) return x; else return boogie(x,y-2) + x; }</pre>	<p>15. What is output by the call mango(12)?</p> <pre>void mango(int k) { if(k < 2) System.out.println(); else { if(k % 2 == 0) { System.out.print(k + " "); mango(k - 1); } else mango(k - 1); } }</pre>
<p>16. What is output by the call rain(5)?</p> <pre>void rain(int k) { if(k <= 0) return; else { rain(k - 1); for(int j=0; j<k; j++) System.out.print("# "); System.out.println(); } }</pre>	
<p>17. What is returned by chalupa("parangaricutirimicuaro",'a')?</p> <pre>int chalupa(String n, char c) { if(n.length() == 1 && n.charAt(0) == c) return 1; if(n.length() == 1 && n.charAt(0) != c) return 0; else { if(n.charAt(0) == c) { return 1 + chalupa(n.substring(1), c); } else return chalupa(n.substring(1), c); } }</pre>	

```

/**
 * Programs for Recursive Worksheet
 * @author (Dominguez)
 */
public class Recursion
{
    public static void main( String args[] )
    {
        System.out.println( "fun1(3) = " + fun1(3) + "\n" +
            "fun4(3,6) = " + fun4(3,6) + "\n" +
            "fun4(4,2) = " + fun4(4,2) + "\n" +
            "fun6(8) = " + fun6(8) + "\n" +
            "fun7(7,2) = " + fun7(7,2) + "\n" +
            "fun7(5,5) = " + fun7(5,5) + "\n" +
            "fun8(2,8) = " + fun8(2,8) + "\n" +
            "go(5) = " + go(5) + "\n" +
            "go(3) = " + go(3) + "\n" +
            "fly(5) = " + fly(5) + "\n" +
            "boogie(5,10) = " + boogie(5,10) + "\n" +
            "chalupa(\"parangaricutirimicuaro\",'a') = " +
            chalupa("parangaricutirimicuaro",'a') + "\n" );
        System.out.println("\nfun2(3): "); fun2(3);
        System.out.println("\n-----");
        System.out.println("fun3(4): "); fun3(4);
        System.out.println("\n-----");
        System.out.println("fun5(4): "); fun5(4);
        System.out.println("\n-----");
        System.out.println("mango(12):"); mango(12);
        System.out.println("\n-----");
        System.out.println("rain(5):"); rain(5);
        System.out.println("\n-----");
    }

    static int fun1(int x)
    {
        if (x<1) return x;
        else return x + fun1(x-1);
    }

    static void fun2(int x)
    {
        if(x<1) System.out.println("\nDONE");
        else
        {
            System.out.print(x);
            fun2(x-1);
        }
    }

    static void fun3(int x)
    {
        if(x<1) System.out.println("OUTPUT: ");
        else
        {
            fun3(x-1);
            System.out.print(x);
        }
    }

    static int fun4( int x, int y)
    {
        if( y == 2) return x;
        else return fun4( x, y - 1) + x;
    }
}

```

```
static void fun5(int x)
{
    if(x<1) System.out.print("\n----\n");
    else
    {
        System.out.print(x);
        fun5(x-1);
        System.out.print(x);
    }
}
```

```
static int fun6(int x)
{
    if (x<1) return x;
    else return x + fun6(x-2);
}
```

```
static int fun7( int x, int y)
{
    if( y == 2) return y;
    else return fun7( x, y - 1) + x;
}
```

```
static int fun8(int x, int y)
{
    if(x<=1) return y;
    else return fun8(x-1,y-1) + y;
}
```

```
static int go(int x)
{
    if(x<1) return 1;
    else return x + go(x-2) + go(x-3);
}
```

```
static int fly(int x)
{
    if(x<1) return 1;
    else return x + fly(x-4) + fly(x-1);
}
```

```
static void mango( int k )
{
    if(k < 2 ) System.out.println();
    else
    {
        if( k % 2 == 0 )
        {
            System.out.print(k + " ");
            mango(k - 1);
        }
        else mango(k - 1);
    }
}
```

```
static int boogie(int x, int y)
{
    if(y<2) return x;
    else return boogie(x,y-2) + x;
}
```

```

static void rain( int k )
{
    if( k <= 0 ) return;
    else
    {
        rain( k - 1 );
        for( int j=0; j<k; j++)
            System.out.print("# ");
        System.out.println();
    }
}

static int chalupa( String n, char c )
{
    if( n.length() == 1  && n.charAt(0) == c ) return 1;
    if( n.length() == 1  && n.charAt(0) != c ) return 0;
    else
    {
        if( n.charAt(0) == c ) return 1 + chalupa( n.substring(1), c );
        else return chalupa( n.substring(1), c );
    }
}
}

```

OUTPUT

```

fun1(3) = 6
fun4(3,6) = 15
fun4(4,2) = 4
fun6(8) = 20
fun7(7,2) = 2
fun7(5,5) = 17
fun8(2,8) = 15
go(5) = 16
go(3) = 7
fly(5) = 23
boogie(5,10) = 30
chalupa("parangaricutirimicuaro",'a') = 4

```

```

fun2(3):
321
DONE

```

```

-----
fun3(4):
OUTPUT:
1234

```

```

-----
fun5(4):
4321
----
1234

```

```

-----
mango(12):
12 10 8 6 4 2

```

```

-----
rain(5):
#
##
###
####
#####
-----

```