### AP CS Recursion Assignment Part 1

### Recursion Questions

1. What is recursion? How does a recursive method differ from a standard iterative method?

Recursion is a method calling itself. Recursive methods call themselves.

1. What are base cases and recursive cases? Why does a recursive method need to have both?

A base case is a case where with certain parameters the method does not call itself. The Recursive case is where the method calls itself

1. What is a call stack, and how does it relate to recursion?

The call stack is the list of the methods that are being run. While running a recursive method, the same method appears again and again in the stack

### Recursive Tracing

1. Consider the following method:

public int mystery(int x, int y) {

if (x % 2 == 1 || y % 2 == 1) {

return 1;

} else {

return 2 \* mystery(x / 2, y / 2);

}

}

For each call below, indicate what value is returned:

Method Call Value Returned

mystery(4, 19) 4

mystery(32, 56) 8

mystery(12, 20) 4

mystery(4, 18) 4

mystery(48, 128) 16

2. Consider the following method:

public int mystery1(int x, int y) {

if (x < y)

return x;

else

return mystery1(x - y, y);

}

For each call below, indicate what value is returned:

Method Call Value Returned

mystery1(6, 13) 6

mystery1(14, 10) \_\_\_\_\_\_\_\_4\_\_\_\_\_\_

mystery1(37, 10) \_\_\_\_\_\_\_\_\_\_\_7\_\_\_\_

mystery1(8, 2) \_\_\_\_\_\_\_\_\_\_\_\_0\_\_\_

mystery1(50, 7) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_1

3. Consider the following method:

public void mystery2(int n) {

if (n <= 1)

System.out.print(n);

else {

mystery2(n / 2);

System.out.print(", " + n);

}

}

For each call below, indicate what output is produced by the method:

Method Call Output Produced

mystery2(1) 1

mystery2(4) 1,2,4

mystery2(16) 1,3,7,15,30

mystery2(30) 1,3,7,15,30,60

mystery2(100) 1,3,6,12,25,50,100