

## Ex1- pre06

The screenshot shows a code editor with a file explorer on the left, a code editor in the center, and a console on the right. The file explorer shows a project structure with folders pre01 through pre06 and files Loops1.class through Loops4.class. The code editor shows the following Java code:

```

1 import java.io.*;
2 import java.util.*;
3
4 public class Loops1 {
5
6     public static void main(String[] args) {
7         loop(10);
8     }
9
10    public static void loop(int n) {
11        int i = n;
12        while (i > 1) {
13            System.out.println(i);
14            if (i % 2 == 0) {
15                i = i / 2;
16            } else {
17                i = i + 1;
18            }
19        }
20    }
21 }
22

```

The console shows the following output:

```

~/cohort-3-prework-A-Ufret$ ls
pre01 pre02 pre03 pre04 pre05 pre06 README.org Testonly
~/cohort-3-prework-A-Ufret$ cd pre06
~/cohort-3-prework-A-Ufret/pre06$ ls
Loops1.java Loops2.java Loops3.java
Loops2.class Loops3.class Loops4.java
~/cohort-3-prework-A-Ufret/pre06$ javac Loops1.java
~/cohort-3-prework-A-Ufret/pre06$ java Loops1
10
5
6
3
4
2
~/cohort-3-prework-A-Ufret/pre06$

```

1. Draw a table that shows the value of the variables `i` and `n` during the execution of `loop`. The table should contain one column for each variable and one line for each iteration.

n	i	Description
10	10	Loop initiated with int i=n, so n=10, yields i=10. Then, the loop takes output i as the next value for n for each iteration. The loop ends at n=4, following if with 4/2 (since remainder=0), it yields i=2. With the condition is defined for “while” i>1, n cannot take on value 2 from output, since 2/2 does not have a remainder, value 2 would follow “if” statement, and yield 2/2 which is equal to 1 and outside the parameters of i>1. Note: n values 5 and 3 follow the “else” statement (i = i + 1), since these values /2 do not have a remainder of 0 (with output for n=5 yielding 5+1=6 and output for 3 yielding 3+1=4. See Table left.
10	5	
5	6	
6	3	
3	4	
4	2	

2. What is the output of this program? Output for Loop method (value for i) when n=10 is:

**i: 10 ➤ 5 ➤ 6 ➤ 3 ➤ 4 ➤ 2**

```
~/cohort-3-prework-A-Ufret/pre06$ java Loops1
10
5
6
3
4
2
~/cohort-3-prework-A-Ufret/pre06$
```

3. Can you prove that this loop terminates for any positive value of  $n$ ?

We know that the loop terminates for any positive value of  $n$

because the loop is defined for “while”  $n > 1$ , with conditions for the output for  $n=2$  specified and “else” for all other values when  $n$  is greater than 1 (and not This means that all positive values for  $n$  are specified with a value, bringing the loop to an end.