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Exercise 1:

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	1
10	10
10	5
10	6
10	3
10	4
10	2
10	1

2. What is the output of this program?

10

5

6

3

3

4

2

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

Positive integer value of n ? Yes.

If $n \leq 1$, the loop terminates.

If n is even, the value decreases by $n/2$.

If n is odd, the value increments by 1, making the value even and then decrementing. This means it'll take 2 steps, but n will decrease by $(n+1)/2$

The only time it could get in a loop is if $n/2$ or $(n+1)/2$ were less than or equal to 1.

$n/2 \leq 1$ when $n \leq 2$. If $n = 2$, it's even and we divide by 2. n becomes 1 and we are done.

$(n+1)/2 \leq 1$ when $n \leq 1$.