Unit 1 Review: Algorithms and Flowcharts

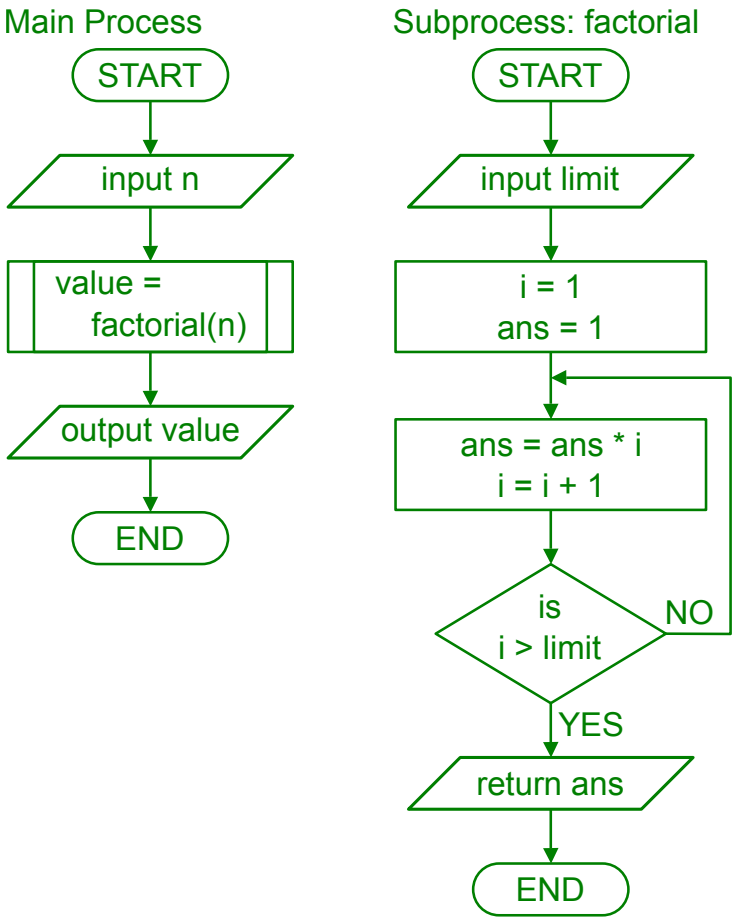
1. Given the following pseudocode, draw the corresponding flowcharts. The flowchart must not only produce the correct answer, it must follow the exact same algorithm.

```
// Main Program
RECEIVE n FROM keyboard
SET value TO factorial(n)
SEND value TO DISPLAY
```

```
FUNCTION factorial(limit)
BEGIN FUNCTION
    SET ans TO 1
    SET i TO 1

    REPEAT
        SET ans TO ans * i
        SET i TO i + 1
    UNTIL i > limit

    RETURN ans
END FUNCTION
```



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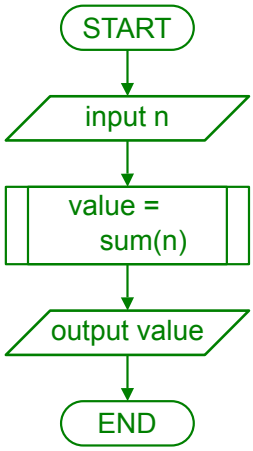
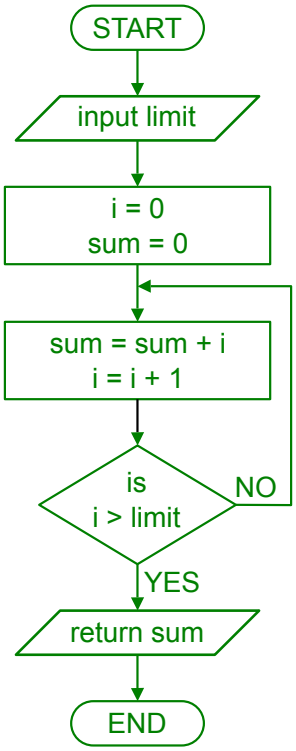
2. Give the flowchart and pseudocode for an algorithm that inputs a number from the user, then calls a subprocess, called `sum`, that calculates the sum of all numbers from zero up to and including that number, and finally outputs the resulting sum. Show the flowchart and pseudocode for both the main process and the subprocess. Consider whether your loop will use a WHILE or a REPEAT statement. You can assume the user enters a whole number (no validation of input required).

   Only one of the two subprocesses below are required for the answer, but the algorithm must match the pseudocode (one flowchart subprocess shows a `WHILE` loop, the other a `REPEAT` loop).

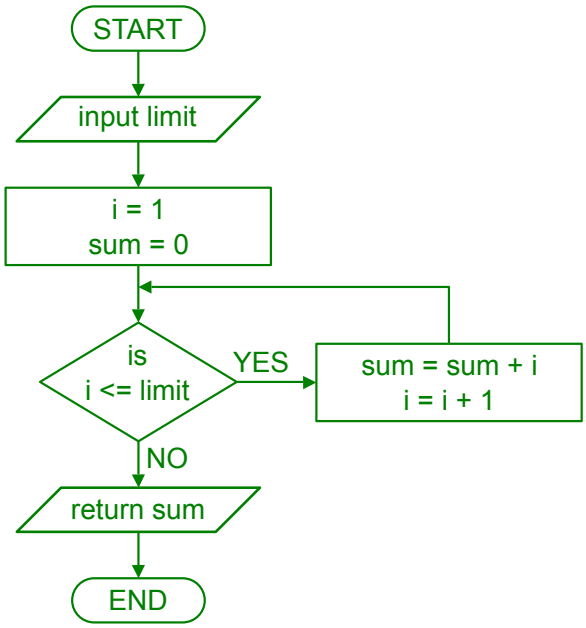
Main Process



Subprocess: sum



Subprocess: sum




```
RECEIVE n FROM keyboard
SET value TO factorial(n)
SEND value TO DISPLAY
```

```
FUNCTION sum(n)
BEGIN FUNCTION
    SET sum TO 0
    SET i TO 0

    REPEAT
        SET sum TO sum + i
        SET i TO i + 1
    UNTIL i > n

    RETURN sum
END FUNCTION
```

```
FUNCTION sum(n)
BEGIN FUNCTION
    SET sum TO 0
    SET i TO 1

    WHILE i <= n DO
        SET sum TO sum + i
        SET i TO i + 1
    END WHILE

    RETURN sum
END FUNCTION
```