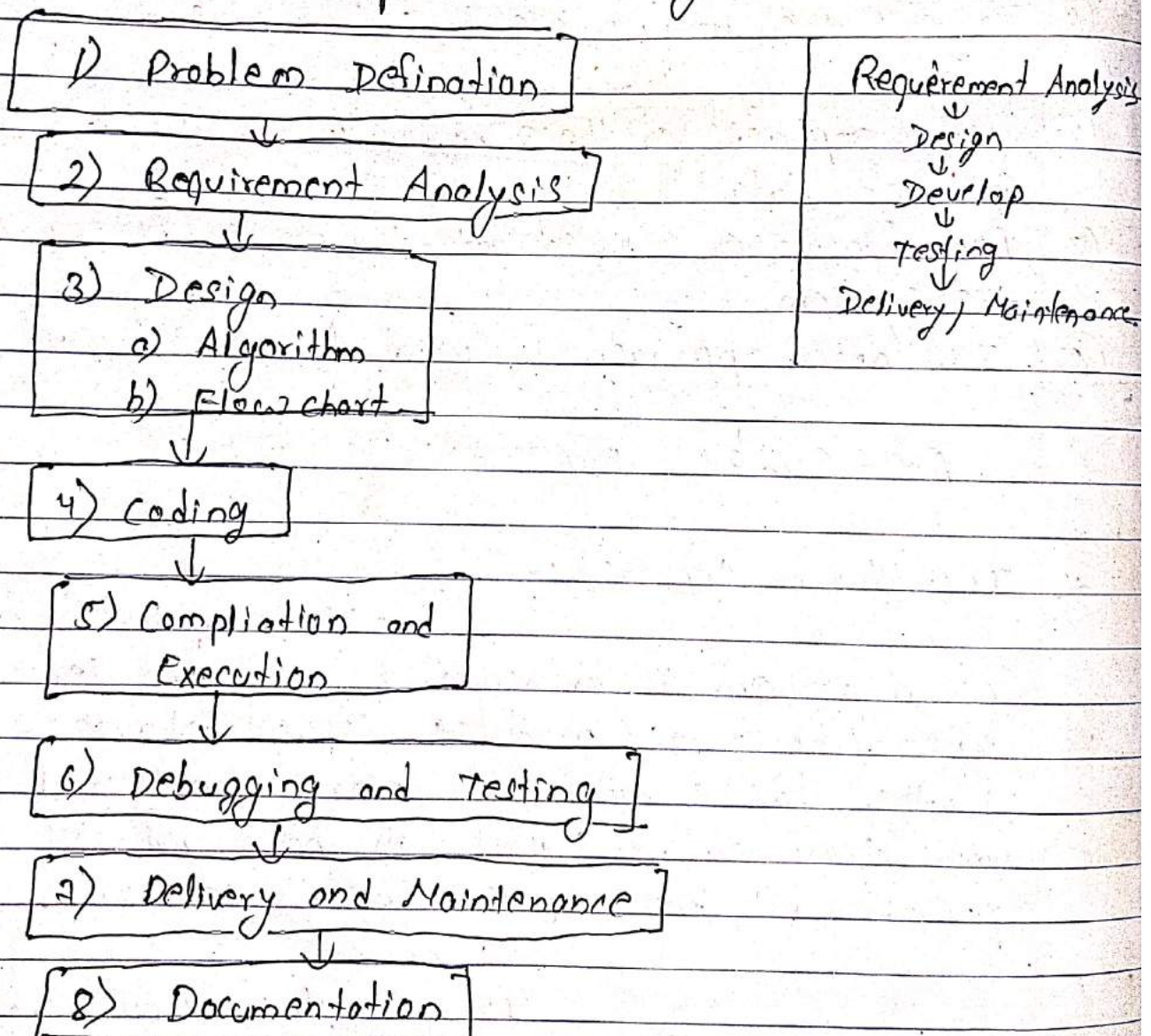


you must always maintain the orizonality of the algorithm.

CHAPTER-2

Programming Logic

* Software Development Life Cycle (SDLC):-



1) Problem Definition:-

It is also called problem analysis. In this step - we should define problem in understandable way without ambiguity or confusion.

2) Requirement Analysis:-

In this phase we should specify objective, input requirement, output requirement, processing requirement and feasibility evaluations.

3) Design:-

This can be done through:-

a) Algorithm:-

Set of instructions written in simple language to solve a particular problem.

b) Flowchart:-

The pictorial / Graphical representation of an algorithm is called flowchart.

4) Coding:-

Each programming language has its own syntax. We should follow rules and syntax properly while coding. The statements should be arranged and comments should be added whenever necessary.

5. Compilation and execution:-

The program needs to be translated using some translator in a machine code which is called compilation. Compiler checks syntax error in the program. The compilation figure is shown below.

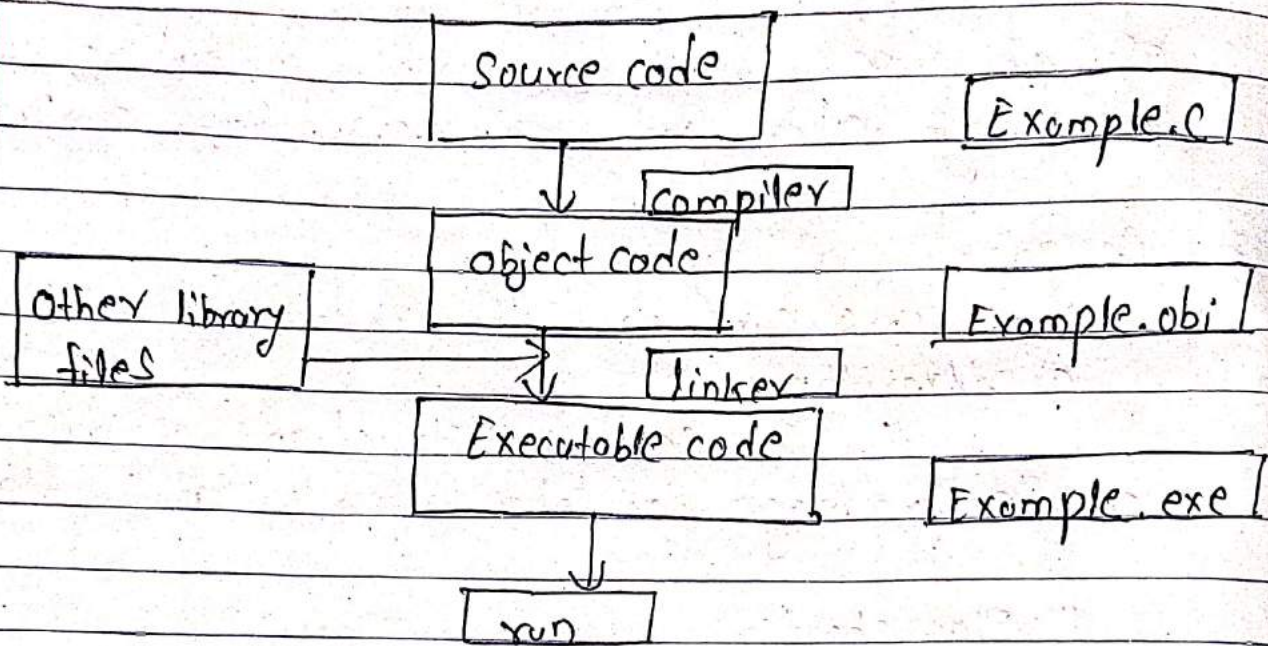


fig: Compilation process

6. Debugging and testing:-

Debugging is the process of detecting or finding the errors and removing it. Testing is the process of checking the desired output for number of inputs.

7. Delivery and maintenance:-

After the desired product

has been developed, it needs to be delivered to concerned authority. The software needs frequent maintenance or update to address problem arising in the future.

g. Documentation :

It starts with very beginning of the ~~ab~~ project and ends with delivery of the product.

(a) Documentation for programmer :

It is required for other developers working on the project for future.

(b) User manual :

A user may need a manual to operate a software system.

* Algorithm and Flowchart

Algorithm :

It is a set of instruction or steps written in simple English language to perform a particular task.

Features of Algorithm :-

- Should be written in simple English language

- Should be understandable and clear to any user.
- Should be language independent (should not depend on any particular programming languages)
- It should consist of infinite number of steps.
- It should not contain any ambiguous instructions or any confusing statements.
- It should terminate after finite number of steps.

Example: The algorithm to add two number can be stated as:

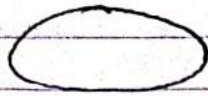
- Step 1: Input numbers as a and b
Step 2: $Sum = x + y$
Step 3: Print the sum

Flowchart:

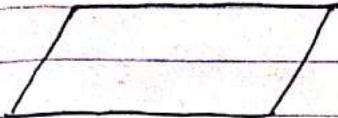
It is a pictorial representation of an algorithm. The flowcharts are helpful in understanding the logic of complicated and lengthy problems. Once the flowchart is drawn it becomes easy to write the program in any high-level language. It contains following standard symbols.

Symbols

Meaning



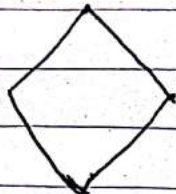
Start / End



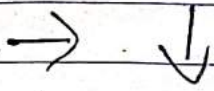
Input/output (scan, print or read)



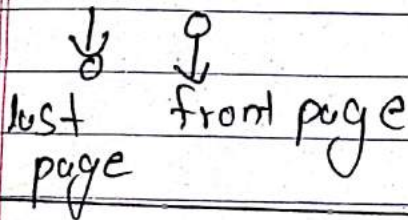
Declaration/processing/assign/calculation.



Decision making (True/False)



Flow line (direction of flow of program instruction)



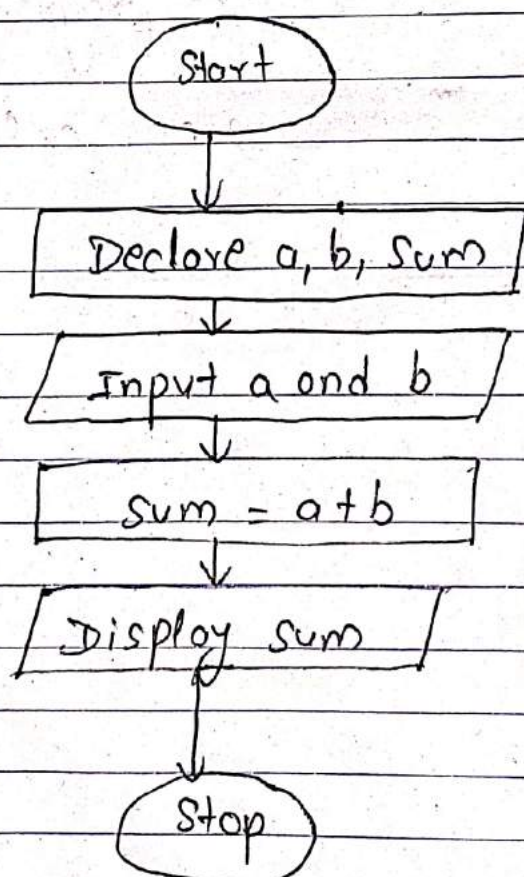
connectors

2. Write an algorithm and flowchart to find sum of two numbers.

* a, b, Sum
Algorithm

- Step 1: Start
 Step 2: Declare variables a, b, Sum
 Step 3: Input / Read / any two numbers and store it in 'a' and 'b' respectively.
 Step 4: Add a and b and store it in Sum. i.e., $Sum = a + b$
 Step 5: Display the result Sum
 Step 6: Stop

Flowchart



2. Write an algorithm and flowchart to find area of a rectangle

Algorithm :-

Step 1: Start

Step 2: Declare variables l , b and area

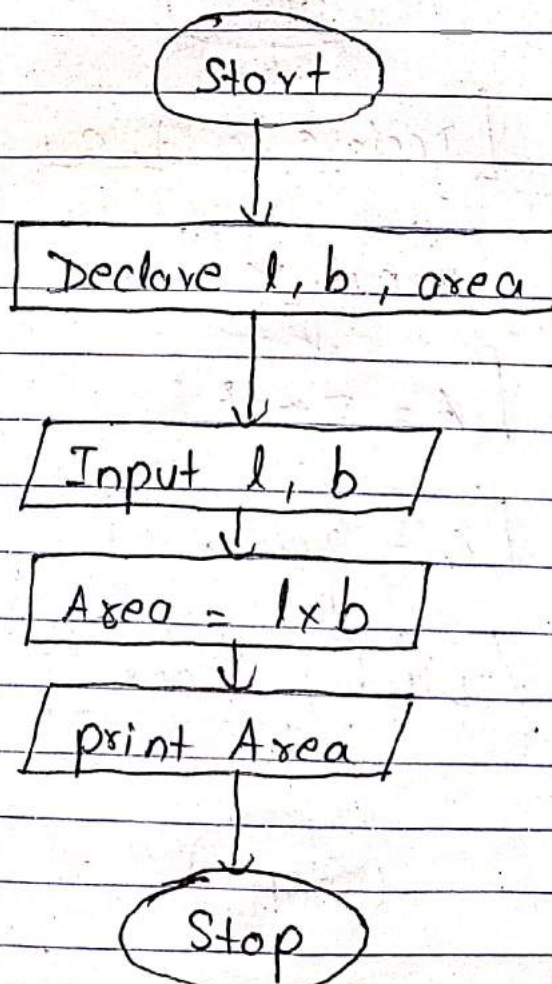
Step 3: Input any two numbers and store it in l and b respectively

Step 4: Multiply l and b and store it in area.
i.e. $area = l \times b$

Step 5: print the result area

Step 6: Stop

Flowchart

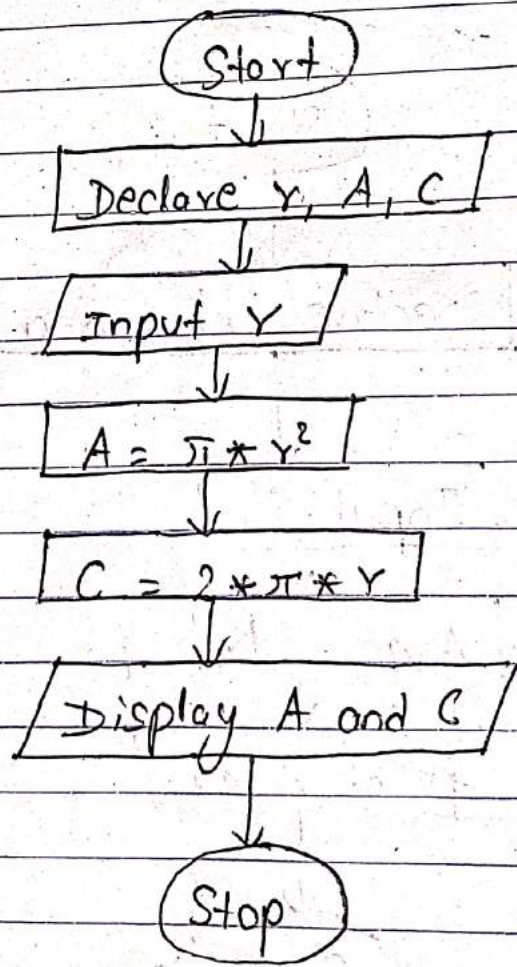


3. Write an algorithm and flowchart to find area and circumference of circle.

Algorithm:-

- Step 1: Start
Step 2: Declare variable r, C, A
Step 3: Input a number and store it in r
Step 4: perform $A = 3.14 \text{ and } r^2$
Step 5: perform $C = 2 * 3.14 * r$
Step 6: Display A and C
Step 7: Stop.

Flowchart

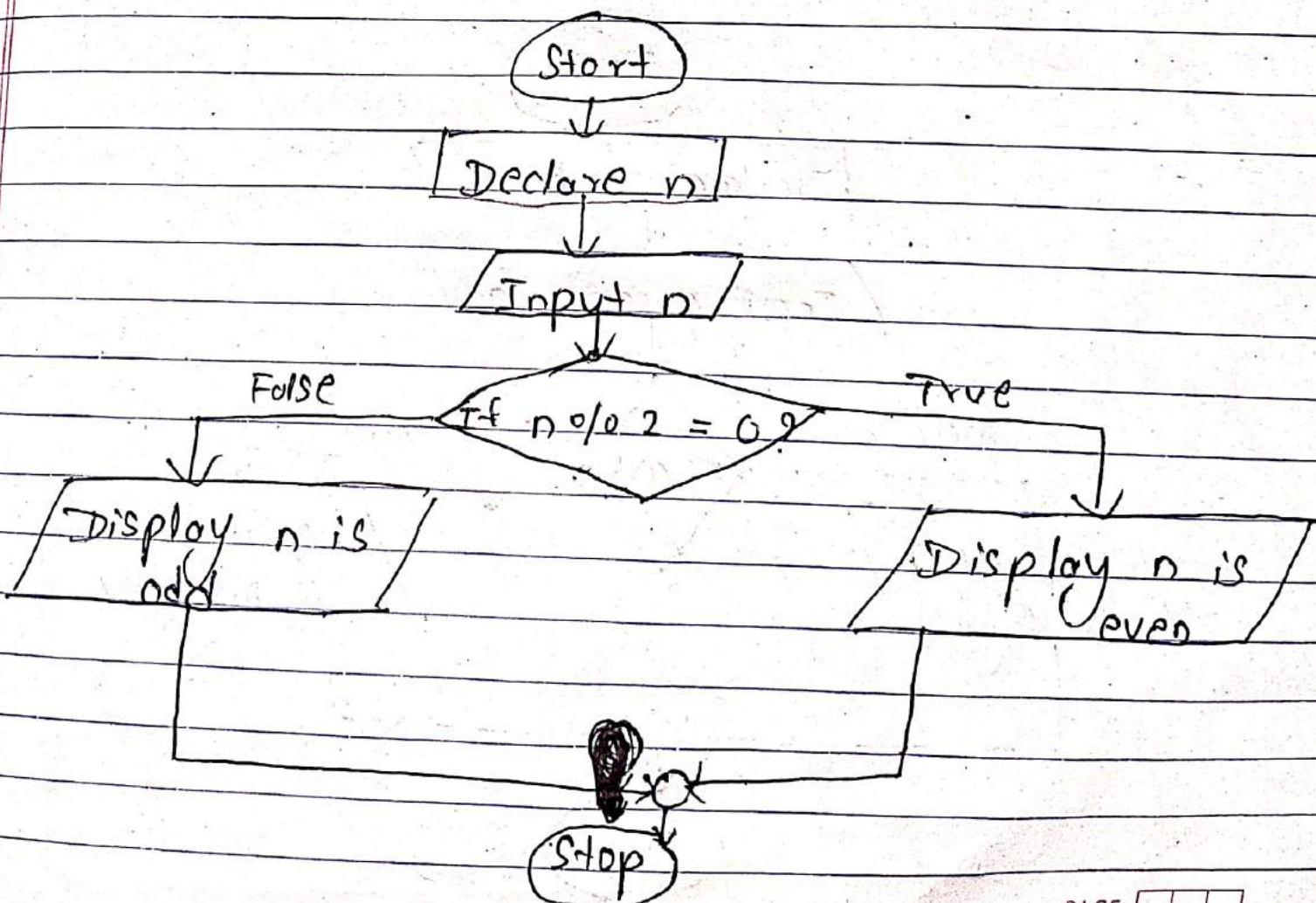


4. Write an algorithm and flowchart to check if given number is even or odd.

If $n \% 2 = 1$ quotient then its
 $n \% 2 = 0$ Remainder then its even.

Algorithm

- Step 1: Start
Step 2: Declare the variable n .
Step 3: Input a number and store it, in n .
Step 4: Check if $n \% 2 = 0$?
Step 5: If true, Display n is even
If false, Display n is odd.
Step 5: Stop



5. Write an algorithm and flowchart to find largest among two number.

Algorithm

Step 1: Start

Step 2: Declare variable a and b.

Step 3: Input any two numbers and store it in a and b respectively

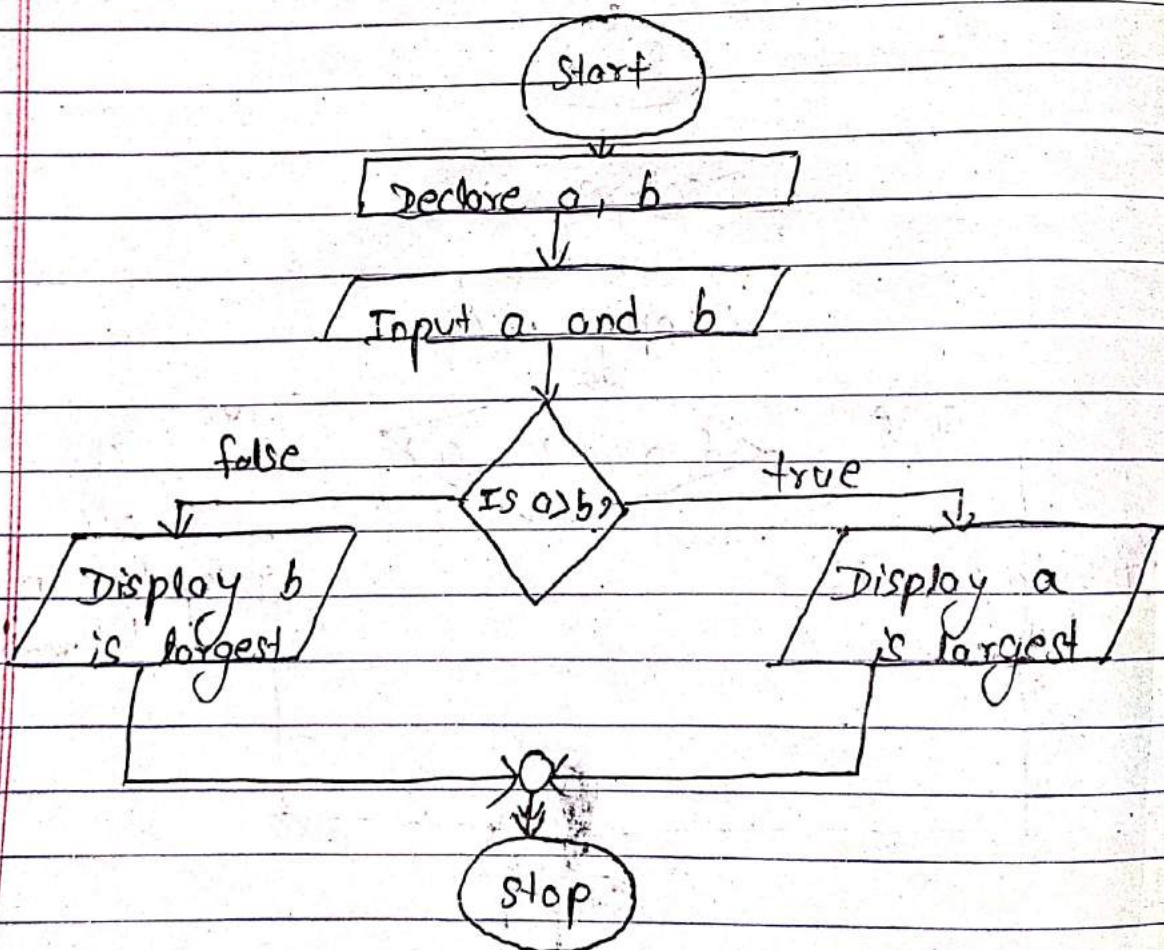
Step 4: Check if $a > b$

If true, Display a is largest

If false, Display b is largest

Step 5: Stop

Flowchart



6. Write an algorithm and flowchart to find if both numbers are equal if not find the largest among two number.

Algorithm

Step 1: Start

Step 2: Declare variable a, b

Step 3: Input any two numbers and store it in a and b respectively

Step 4: Check if $a = b$?

If true, Display both are equal

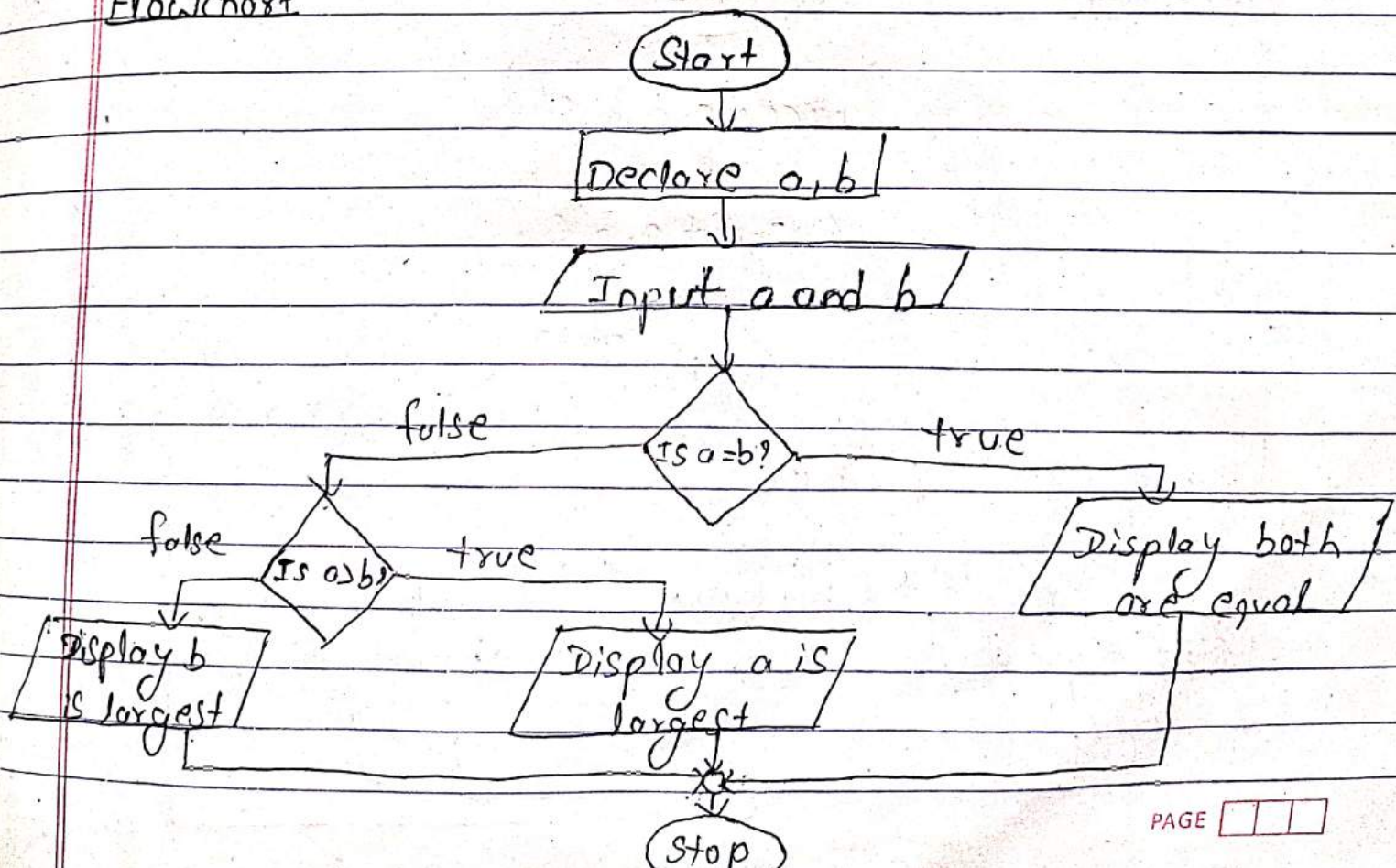
If false, check if $a > b$?

If true, display a is largest

If false, display b is largest

Step 5: Stop

Flowchart



7. Write an algorithm and flowchart to find largest number among three numbers.

Algorithm

Step 1: Start

Step 2: Declare variable a, b, c

Step 3: Input a, b, c

Step 4: Check if $a > b$ and $a > c$?

if true, display a is largest

if false, goto Step 5

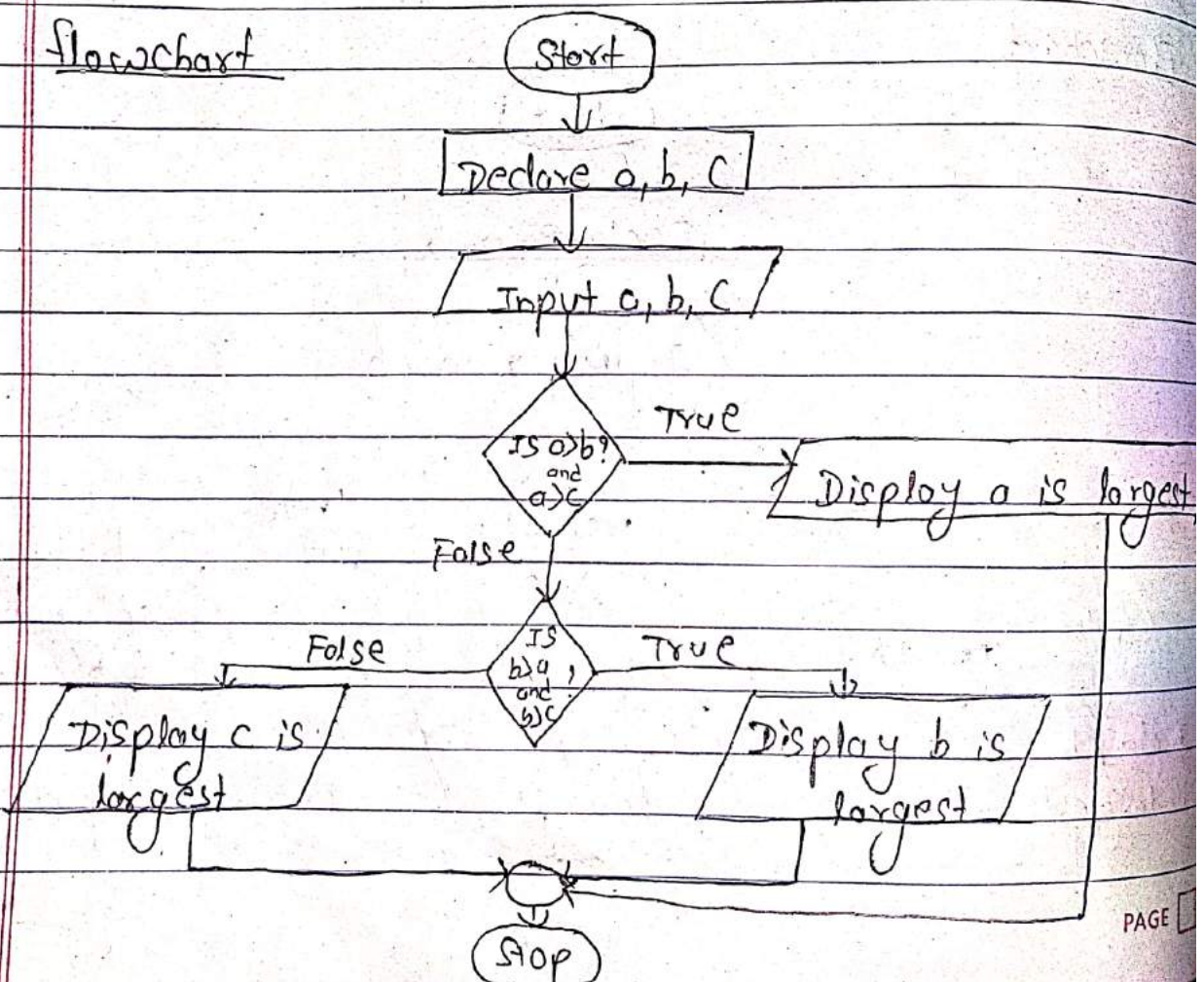
Step 5: Check if $b > a$ and $b > c$?

if true, display b is largest

if false, display c is largest

Step 6: Stop

Flowchart



Q Write an algorithm and flowchart to find the sum of first 10 numbers.

$0+1 = 1$	$Sum = 0, i = 1$
$1+2 = 3$	$Sum = Sum + i$
$3+3 = 6$	$i = i + 1$
$6+4 = 10$	$i \leq 10$
	Stop.

Algorithm

Step 1: Start

Step 2: Declare variable Sum, i

Step 3: Assign $Sum = 0, i = 1$

Step 4: Add Sum and i and store the result in Sum.
i.e; $Sum = Sum + i$

Step 5: Increase i by 1 i.e; $i = i + 1$

Step 6: Check if $i \leq 10$?

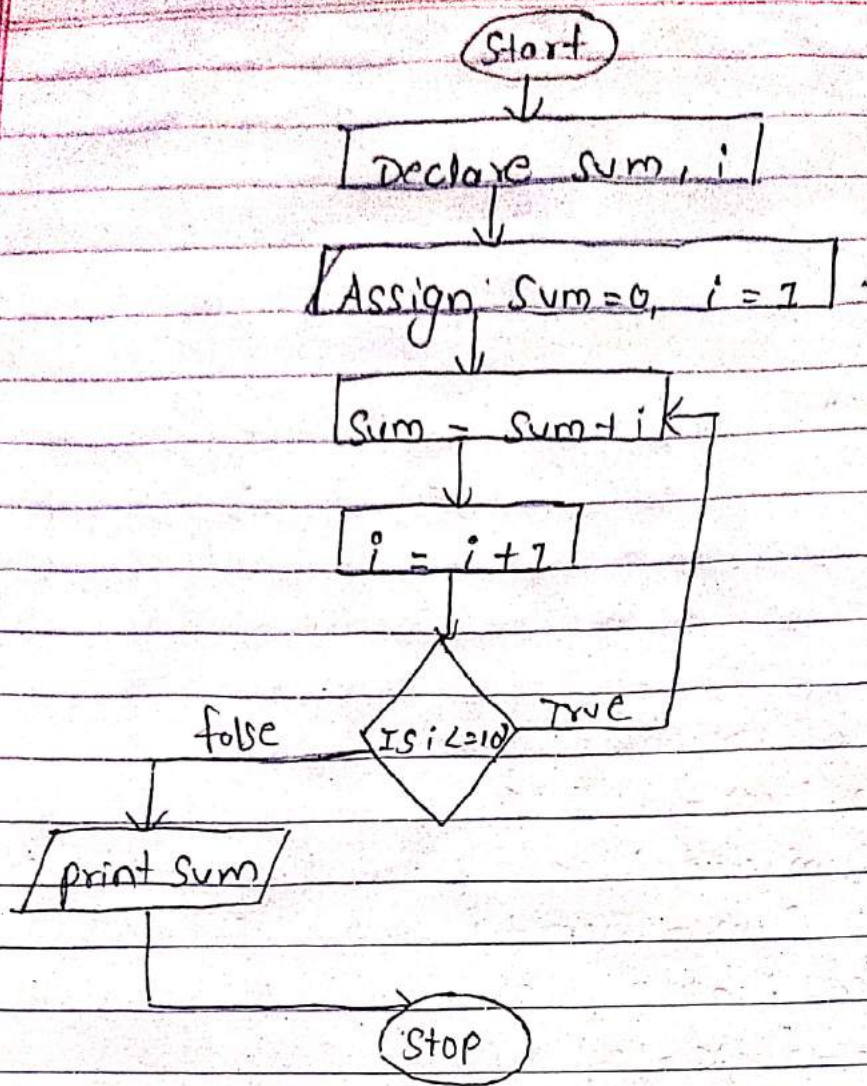
if true, go to Step 4

if false, display Sum

Step 7: Stop.

Flowchart :-





9. Write an algorithm and flowchart to find the sum of first n natural numbers.

Algorithm

- Step 1: Start
- Step 2: Declare variable sum, i, n
- Step 3: Input value of n
- Step 4: Assign sum = 0, i = 1
- Step 5: Add sum and i and store the result in sum
i.e; $sum = sum + i$

Step 6: Increase i by 1. ie; $i = i + 1$

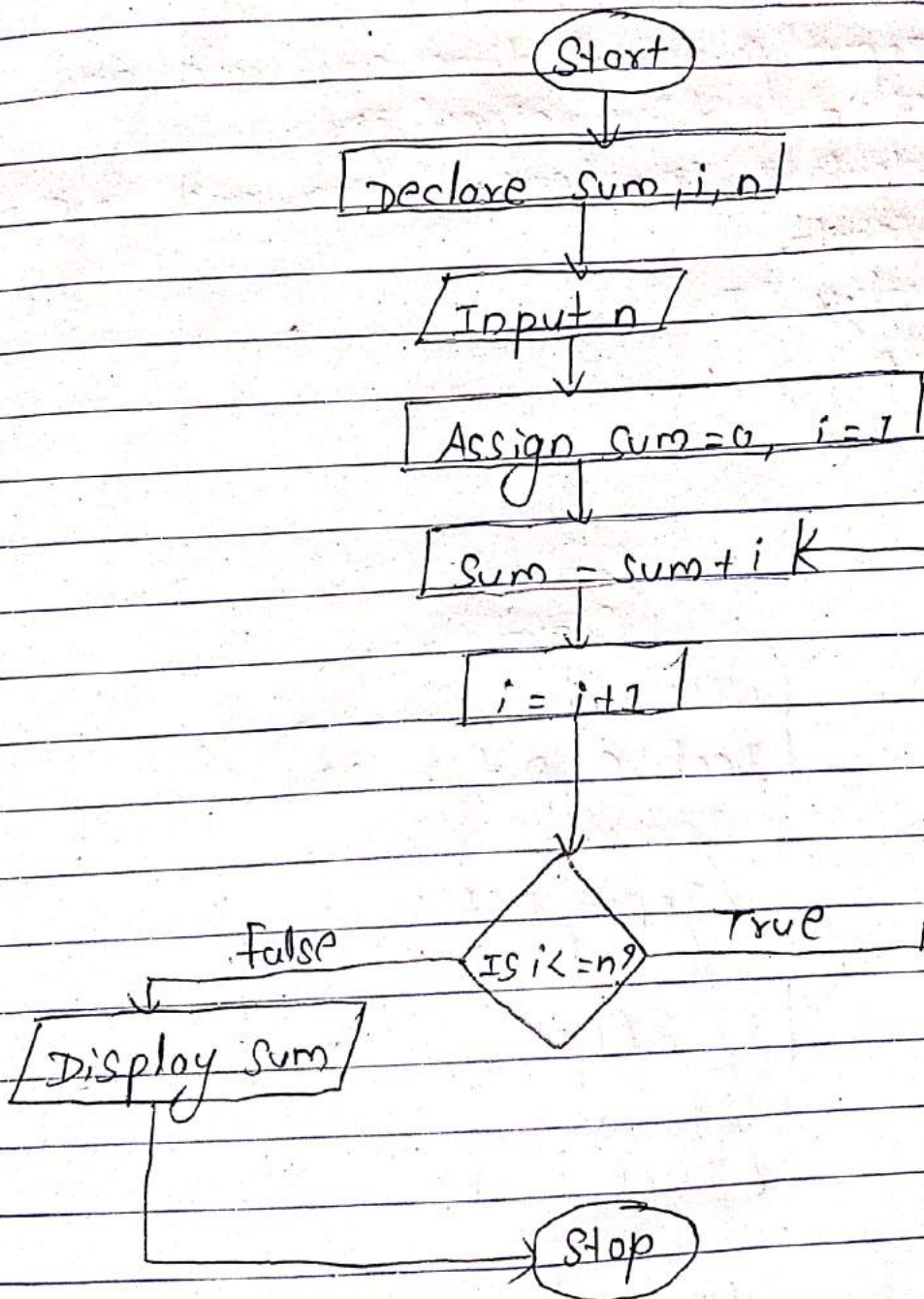
Step 7: Check if $i \leq n$?

if true, go to step 5

if false, ~~if~~ display sum

Step 8: Stop

Flowchart



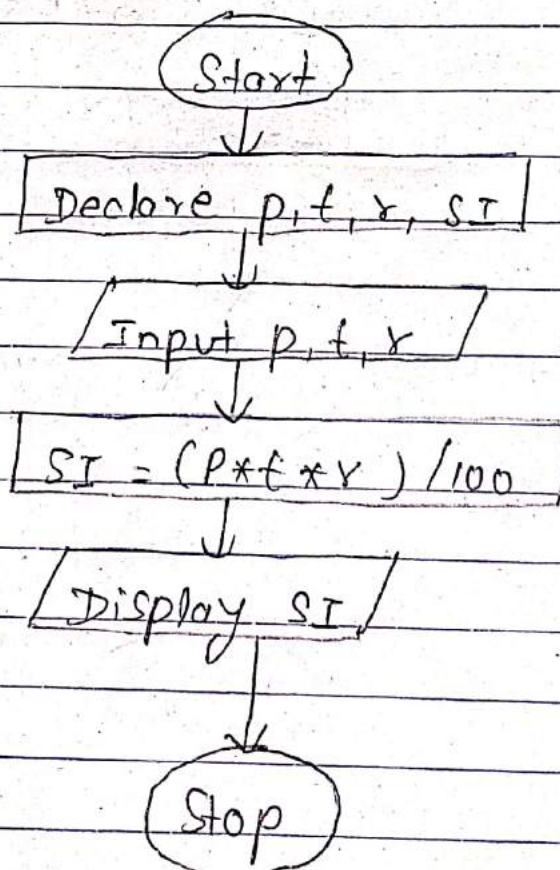
10. Write an algorithm and flowchart to calculate simple interest.

$$SI = (p \times t \times r) / 100$$

Algorithm

- Step 1: Start
Step 2: Declare P, t, r, SI
Step 3: Input principal, time and rate and store it in p, t, r respectively.
Step 4: Calculate $SI = (p \times t \times r) / 100$ and store the result.
Step 5: Display SI
Step 6: Stop.

Flowchart



21. Write an algorithm and flowchart to find whether the given number is positive or negative.

Algorithm

Step 1: Start

Step 2: Declare n

Step 3: Input n

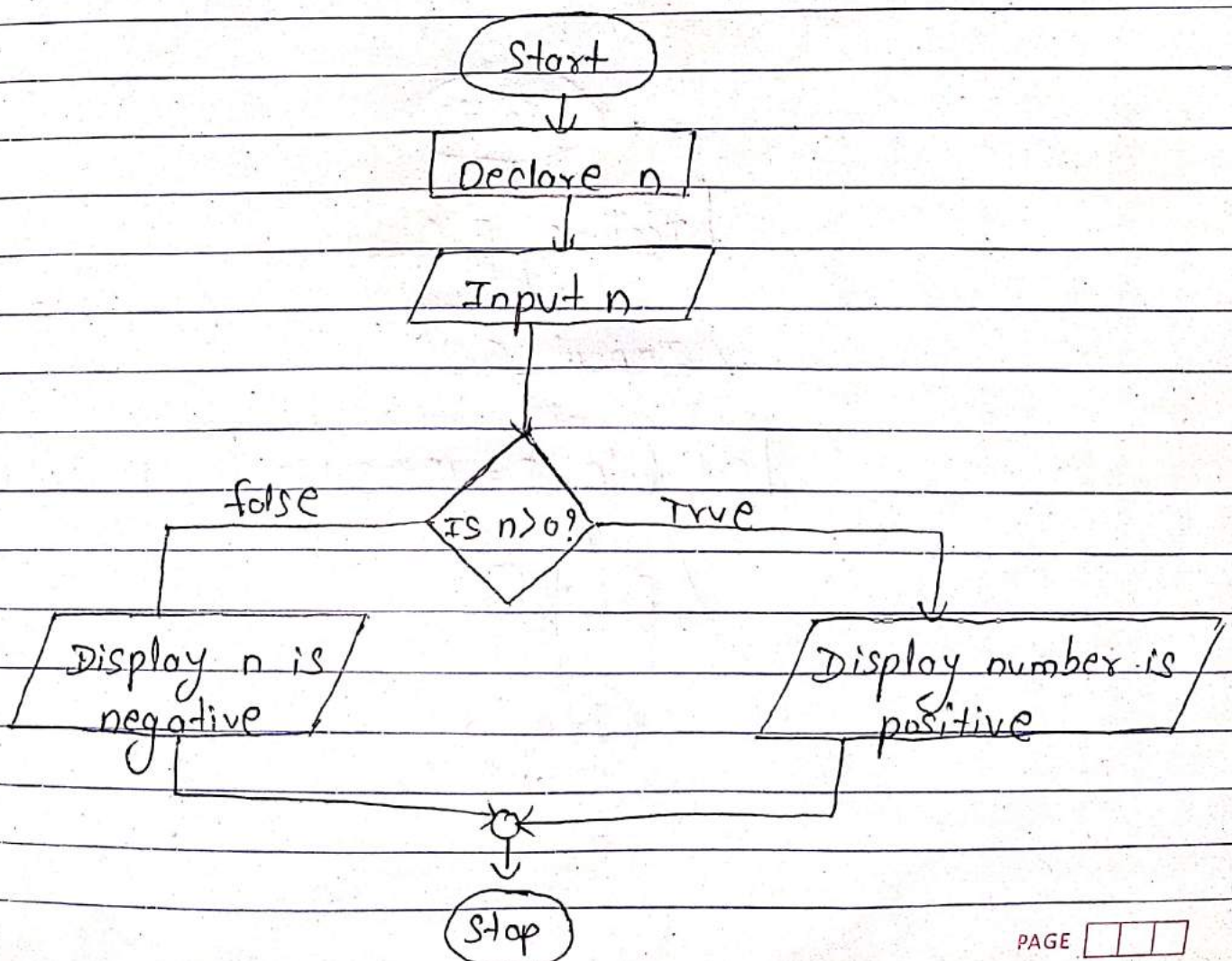
Step 4: Check if $n > 0$

if true, Display n is positive

if false, display n is negative

Step 5: Stop

Flowchart

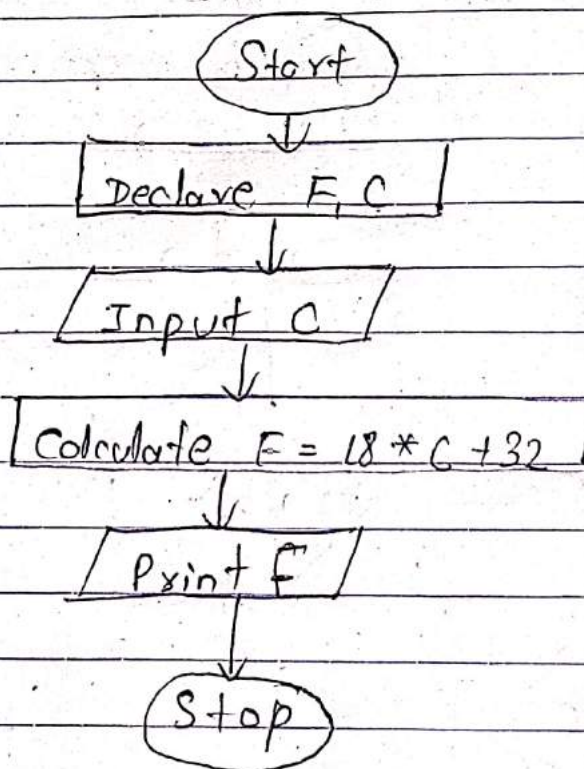


- 12 Write an algorithm and flowchart to convert temperature in fahrenheit when temperature in celcius given.

Algorithm:-

- Step 1: Start
Step 2: Declare F, C
Step 3: Input C
Step 4: Calculate $F = 1.8 * C + 32$
Step 5: print F
Step 6 : Stop

Flowchart



13. Write an algorithm and flowchart to calculate area of triangle when 3 sides are given.

$$\text{Area} = [s * (s-a) * (s-b) * (s-c)]^{0.5}$$

$$s = \frac{(a+b+c)}{2}$$

Algorithm

- Step 1: Start
- Step 2: Declare s, a, b, c, area .
- Step 3: Input 3 numbers and store it in a, b and c respectively.
- Step 4: Calculate $s = (a * b * c) / 2$
- Step 5: Calculate $\text{area} = [s * (s-a) * (s-b) * (s-c)]^{0.5}$
- Step 6: print area
- Step 7: Stop

Flowchart

