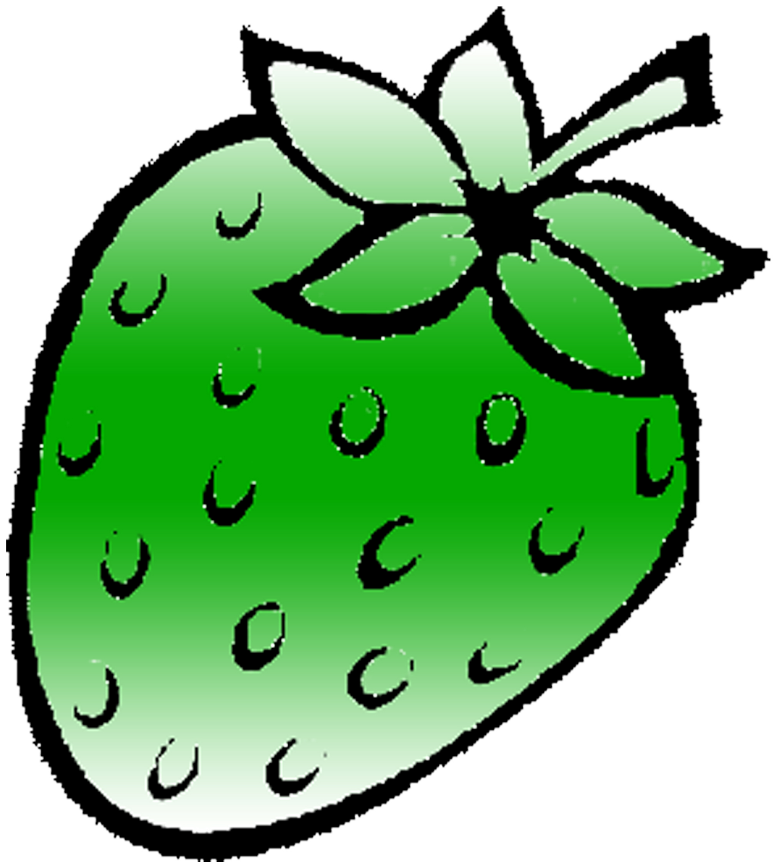
STRAWBERRY



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Experiment No.01

PART A

(PART A: TO BE REFFERED BY STUDENTS)

A.1 Aim: **To study Algorithm and Flow charts.**

1. Write an algorithm and draw Flow chart for finding perimeter of a rectangle.
2. Write an algorithm and draw flow chart to determine whether entered number is odd or even.
3. Write an algorithm and draw flow chart to print multiplication table for any number entered by user.
4. Write an algorithm and draw flow chart to print numbers from 10 to 01.
5. Write an algorithm and draw flow chart to perform mathematical operations like addition, multiplication, division and subtraction based on user's choice.

A.2 Prerequisite:

Method of writing algorithm and different symbols of Flow chart.

A.3 Outcome:

After successful completion of this experiment students will be able to

1. **Illustrate flowchart and algorithm for a given problem**

A.4 Theory:

The computer is used to solve problems which are first identified and designed before being programmed for a computer. Algorithms are used to design the solution of a problem. Therefore, we can say that an algorithm is a tool for solving any computational problem.

Algorithm is defined as finite sequence of instructions to solve a problem. It is the development of proper procedure to get the required results. It is defined as a sequence of instructions. These instructions are applied on raw data known as input and the solution of the problem produced is called the output.

There are three main features of Algorithm as below:

1. Sequence: Each step of process in the algorithm is executed in the specified order.
2. Decision
3. Repetition

Decision:

The outcome of a decision will be either true or false.

- If today is Friday then collect pay.
  - It is either true that 'today is Friday' or it is false that 'today is not Friday'.
  - It cannot be both.

General Form:

If Proposition	If Friday
then process1	then collect pay
else	else
process 2	call on next Monday

Repetition:

- Repeat a process or sequence of process until a condition becomes true.

General Form:

Repeat	Repeat
Process1	Fill water in kettle
Process2	Until Kettle is full
………	
……..	
Process N	
Until Proposition	

Repetition using while:

General form:

While proposition While kettle is not full

begin fill water in kettle.

Process1

Repetition using if then goto

If construct will check a condition and if condition is true, control will transfer to a particular statement specified in goto construct.

For example:

1. Fill some water in kettle
2. If kettle not full then goto 1.

Variables:

1. Program consists of algorithm (Process) and data.
2. Data needs to be stored.
3. Data is contained (stored) in what is called a 'variable'.
4. The variable is a container of a value that may change during the execution of the program.

Each variable is given meaningful name.

Example: sum, total, number1, number2, water_level, water_temperature

Conventions used in writing algorithm:

1. Each algorithm will be logically enclosed by two statements START and STOP.
2. To accept data from user, the INPUT or READ statements are to be used.
3. To display any user message or the content in a variable PRINT statement will be used.

Operators used for writing algorithm:

1. **Arithmetic operators:**

The arithmetic operators used are ←(assignment operator), +(plus), -(minus), *(multiplication), /(division), %(mod)

← Assignment operator is used to assign value to the variable.
For example: x←6, where x is variable, expression will assign value 6 to the variable x.

Other valid statements: X, Y and Z are variables
Z←X+Y
Z←X-Y
Z←X/Y
Z←X%Y

2. **Relational operators:**

The relational operators used are as below:

- > greater than
- < less than
- >= greater than or equal to
- <= less than or equal to
- == equal equal to (for comparing two values)
- != Not equal to

For example:

'>' greater than

X>Y means if the value contained in X is larger than that in Y then outcome of the expression is true else outcome of expression is false.

'<=' Less than or equal to

X<=Y means that if the value held in X is either less than or equal to the value held in Y then outcome of the expression is true else false.

3. **Logical operators:**
The logical operators used are 'AND' and 'OR'.
   - AND conjunction: The outcome of the expression is true when both propositions are true otherwise it is false.

   X←2

Y←1

X=2 AND Y=0

X=2 true but Y=0 is false

So outcome of total expression is false.

- 'OR' Disjunction: The outcome of an expression is true when anyone of the propositions is true else it is false.

X←2

Y←1

X=2 OR Y=0

X=2 is true but Y=0 is false

But as 'OR' is used as one proposition is true result for entire expression will be true.

Sample Algorithms:

- **Algorithm for finding the sum of any two numbers.**

Solution: Let the two numbers be A and B and let their sum be equal to C. Then, the desired algorithm is given as follows:

1. START
2. PRINT "ENTER TWO NUMBERS"
3. INPUT A, B
4. C← A+B
5. PRINT C
6. STOP

- **Algorithm for determining the remainder of a division operation where the dividend and divisor are both integers.**

Solution: Let N and D be the dividend and divisor, respectively. Assume Q to be the quotient, which is an integer, and R to be the remainder. The algorithm for the given problem is as follows:

1. START
2. PRINT "ENTER DIVIDEND"
3. INPUT N
4. PRINT "ENTER DIVISOR
5. INPUT D
6. Q←N/D (INTEGER DIVISION)
7. R← N-Q*D
8. PRINT R
9. STOP

- Write an algorithm that compares two numbers and prints either the message identifying the greater number or the message stating the both numbers are equal.

Solution: Let A and B be two variables to represent the two numbers that are being compared. The algorithm for this problem is given as follows:

1. START
2. PRINT "ENTER TWO NUMBERS"
3. INPUT A,B
4. IF A>B THEN
   PRINT "A IS GREATER THAN B"
5. IF B>A THEN
   PRINT "B IS GREATER THAN A"
6. IF A==B THEN
   PRINT "BOTH ARE EQUAL"
7. STOP

- Take three sides of a triangle as input and check whether the triangle can be drawn or not. Classify the triangle as equilateral, isosceles, or scalene.

Solution: Let the length of three sides of triangle be represented by A, B and C. Solution for the algorithm is as follows:

1. START
2. PRINT "ENTER LENGTH OF THREE SIDES OF A TRAINGLE"
3. INPUT A,B, C
4. IF A+B>C AND B+C>A AND A+C >B
   THEN PRINT"TRAINGLE CAN BE DRAWN"

```
   ELSE
      PRINT "TRIANBLE CANNOT BE DRAWN"  :GO TO 6.
5. IF A=B AND B=C THEN
      PRINT "EQUILATERAL"
   ELSE
     IF A!=B AND B!=C THEN
       PRINT "SCALENE"
   ELSE
     PRINT "ISOSCELES"
6. STOP
```

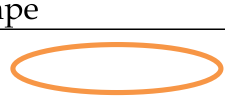
- Construct an algorithm for incrementing the value of a variable that starts with an initial value of 1 and stops when the value becomes 5.

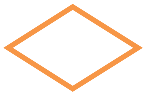
Solution: Let the variable be represented by C. The algorithm for the said problem is given as follows:

1. START
2. C← 1
3. WHILE C<=5
4. BEGIN
5. PRINT C
6. C← C+1
7. END

FLOWCHART:

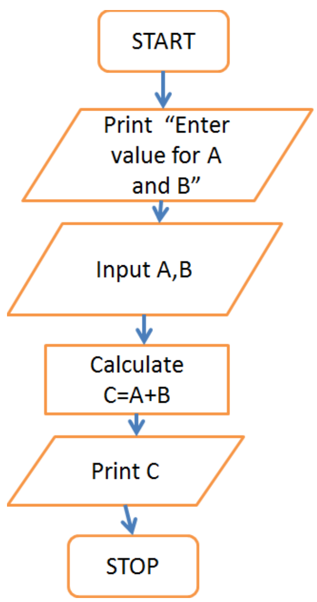
A flowchart is a pictorial representation of an algorithm. It shows the logic of the algorithm and the flow of control. The flowchart uses symbols to represent specific actions and arrows to indicate the flow of control. The activity to be performed is written within the symbols in English. The symbols used are shown as below:

Sr.No	Shape	Description
1		**Ellipse:** To represent the start and end of algorithms
2		**Parallelogram:** To represent the input and output or the read and write operations of algorithms.

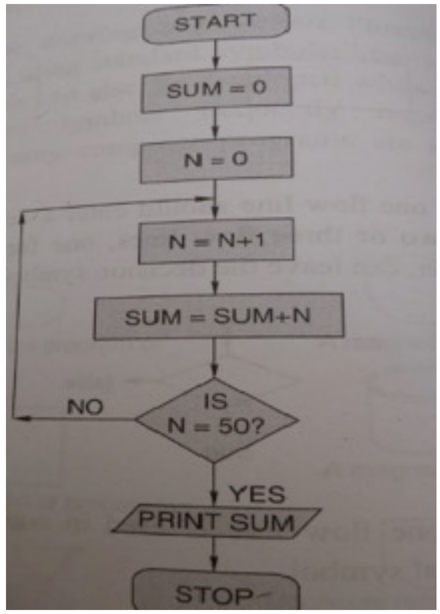
3		**Rectangle:** To represent the processing of instructions.
4		**Diamond:** To represent branching of the statements. To take decisions. There will be one entry point and more than one exit point.
5		**Arrow:** To represent flow of data or the sequence of statements.

Example:

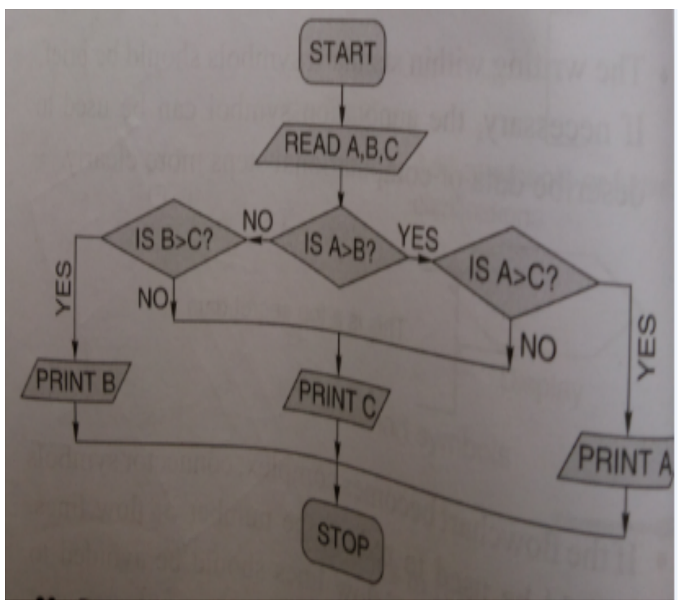
Flowchart for finding sum of two numbers:



Draw a flowchart to find the sum of the first 50 natural numbers:



Draw a flow chart to find the largest of three numbers A, B and C.



PART B

(PART B: TO BE COMPLETED BY STUDENTS)

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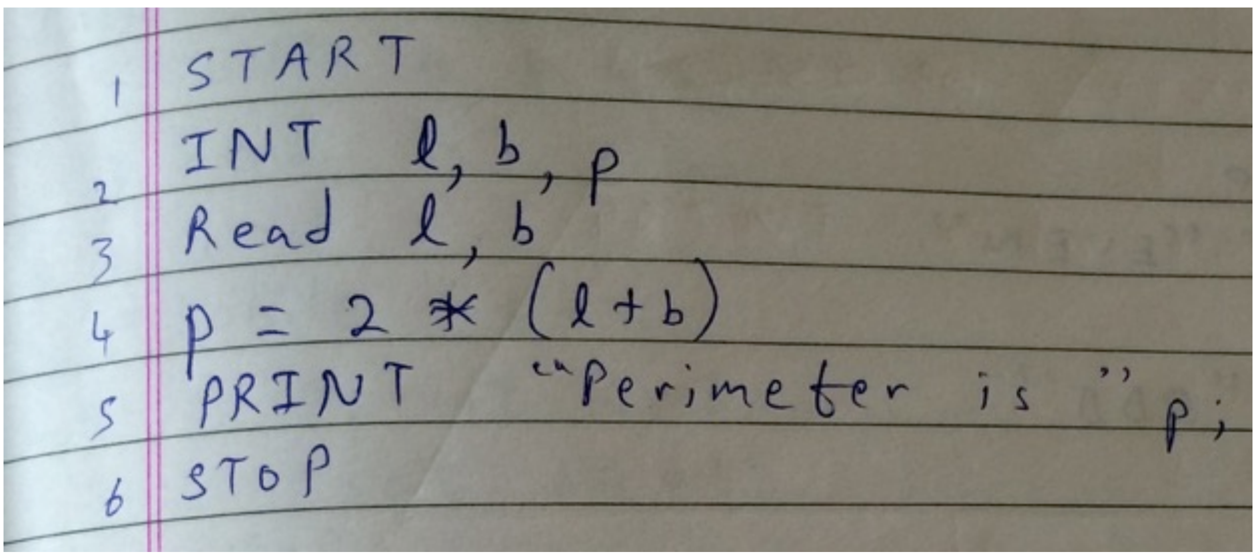
(Students must submit the soft copy as per following segments within two hours of the practical. The soft copy must be uploaded on the Blackboard or emailed to the concerned lab in charge faculties at the end of the practical in case the there is no Black board access available)

Roll No.	Name:
Program:	Division:
Semester: 1	Batch :
Date of Experiment:	Date of Submission:
Grade :	

B.1 Algorithm

1.


1 START
2 INT l, b, p
3 Read l, b
4 p = 2 * (l+b)
5 PRINT "Perimeter is" p;
6 STOP

2.

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Ans 1 START

2 INT n

3 Read n

4 If n%2==0

PRINT "EVEN"

ELSE

PRINT "ODD"

5 STOP

3.

Ans 1 START

2 INT a, b

3 Read a

4 $b = 1$

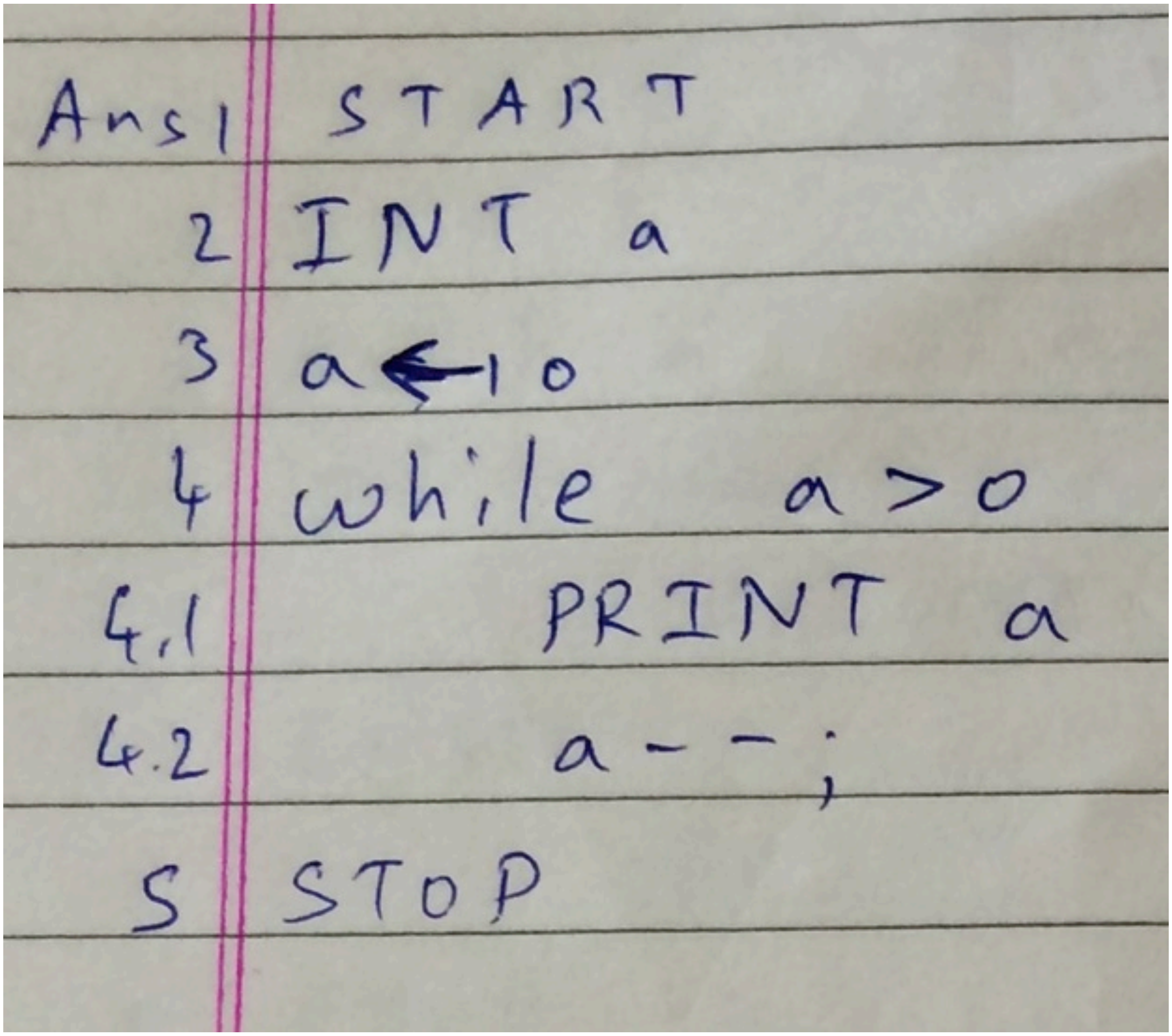
5 while $b < 11$

5.1 print $a \times b$

5.2 set $b = b + 1$

6 STOP

4.



Ans 1 START

2 INT a

3 a ← 10

4 while a > 0

4.1 PRINT a

4.2 a--;

5 STOP

5.

Ans:

```
1  START
2  INT  a, b, c, r
3  PRINT "ENTER TWO NUMBERS:";
4  Read  a, b
5  PRINT "ENTER 1 for add"
6  PRINT "ENTER 2 for subtract"
7  PRINT "ENTER 3 for multiply"
8  PRINT "ENTER 4 for divide"
9  Read  c
10 IF  c==1
          r=a+b
   ELSE  IF  c==2
          r=a-b
   ELSE  IF  c==3
          r = a*b
   ELSE  IF  c==4
          r = a/b

   ELSE
          PRINT "INVALID INPUT"
          GO TO 12
11 PRINT "RESULT IS" r;
12 STOP
```

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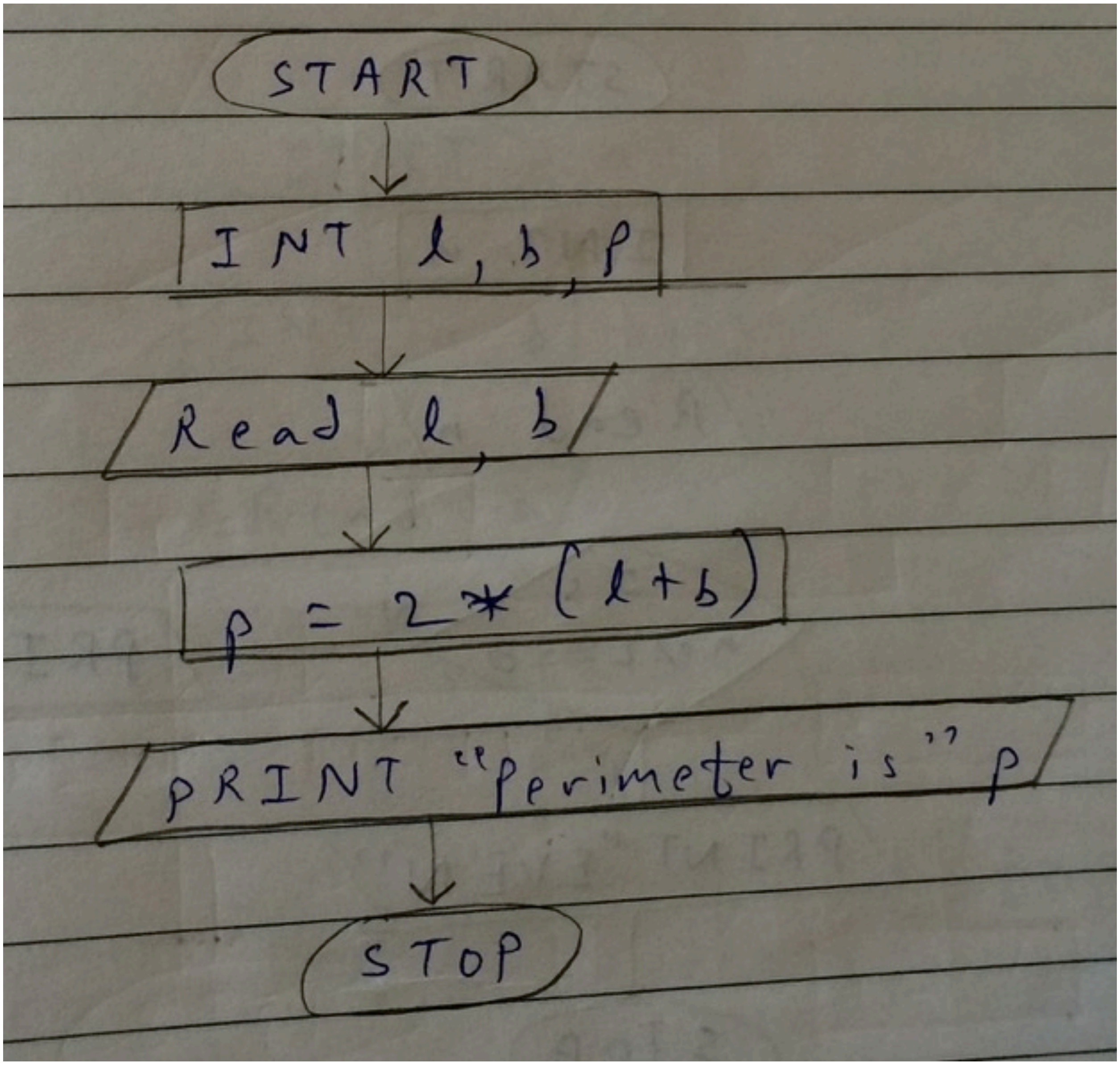
B.2 Flow Chart

1.



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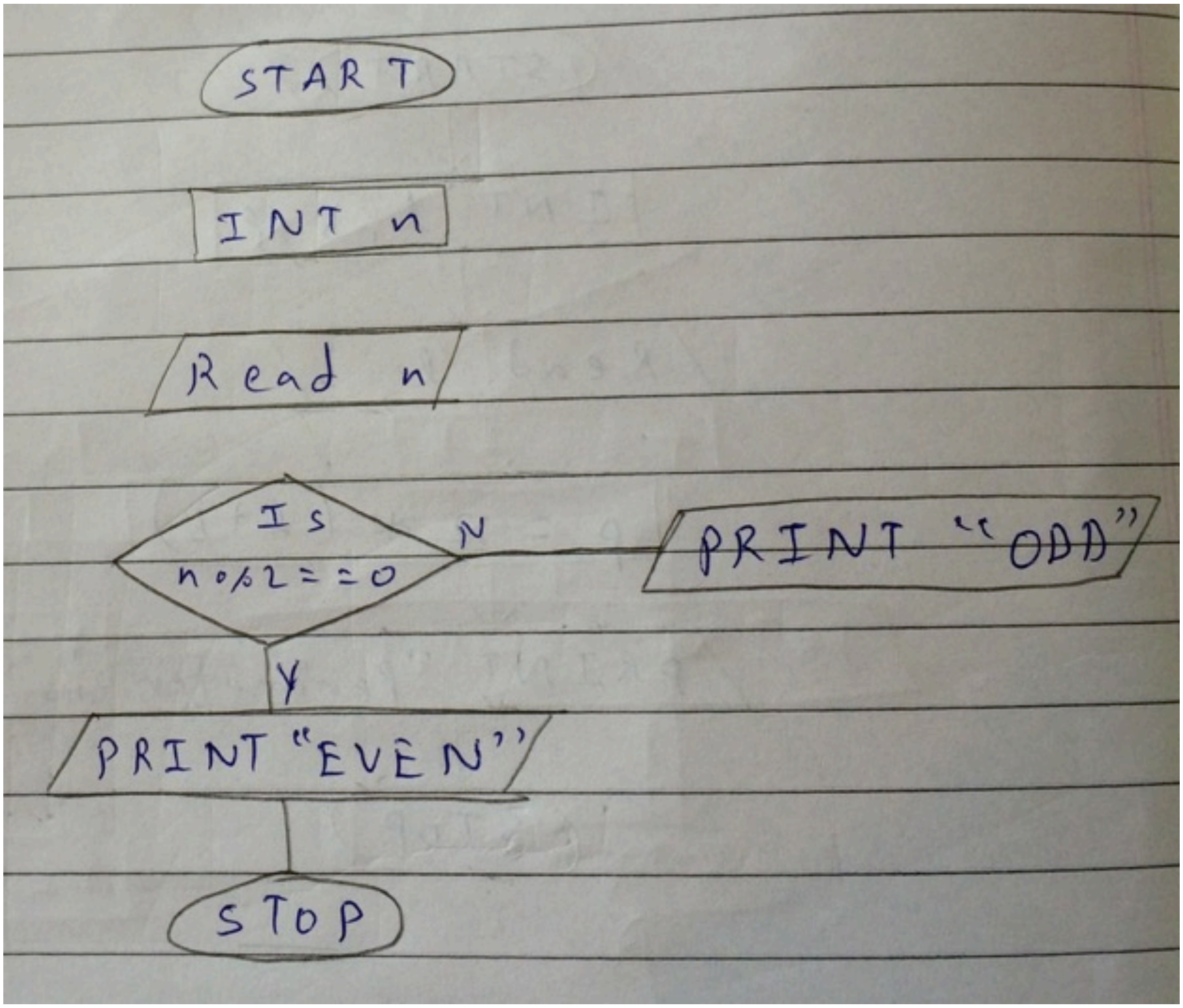
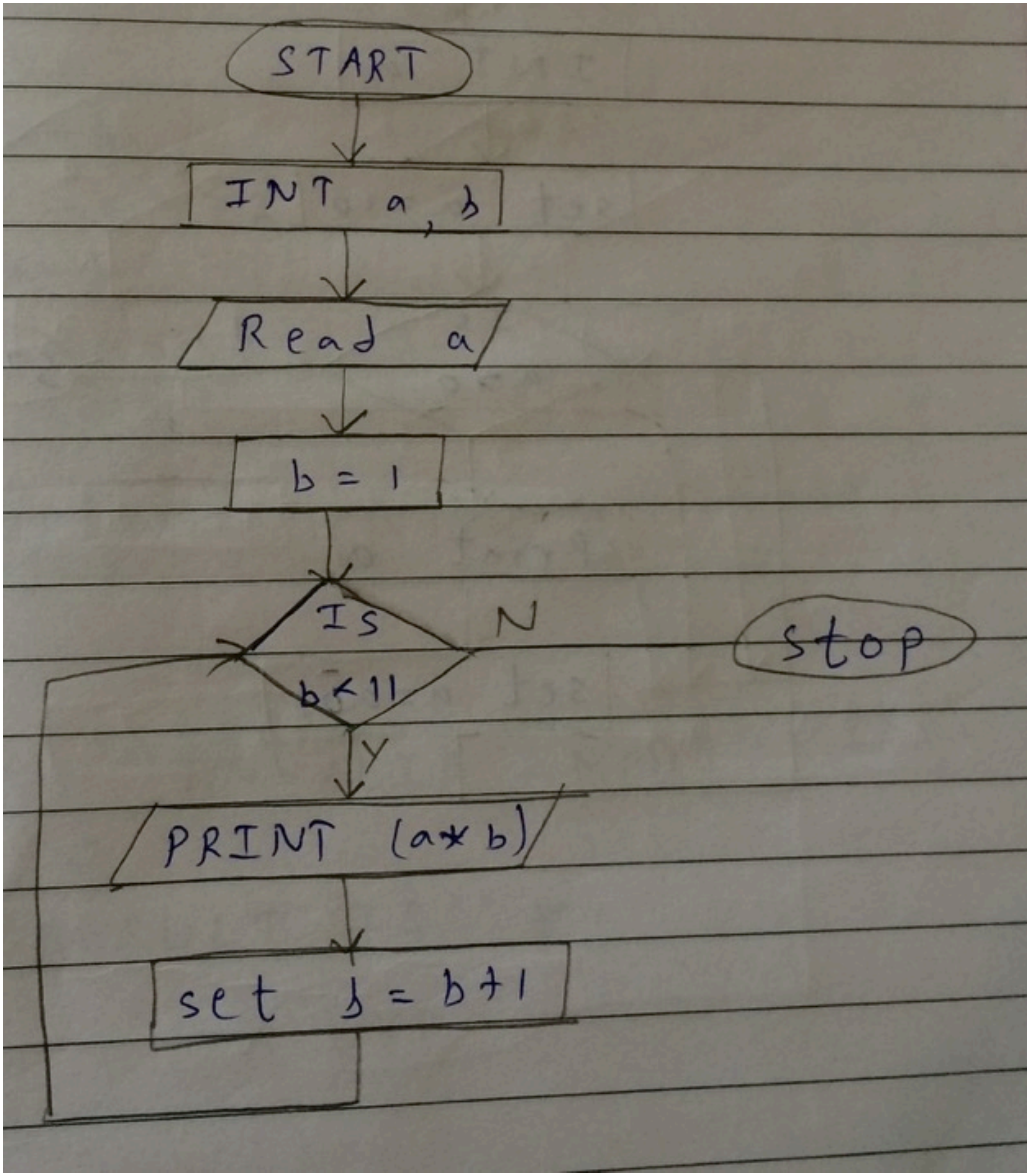
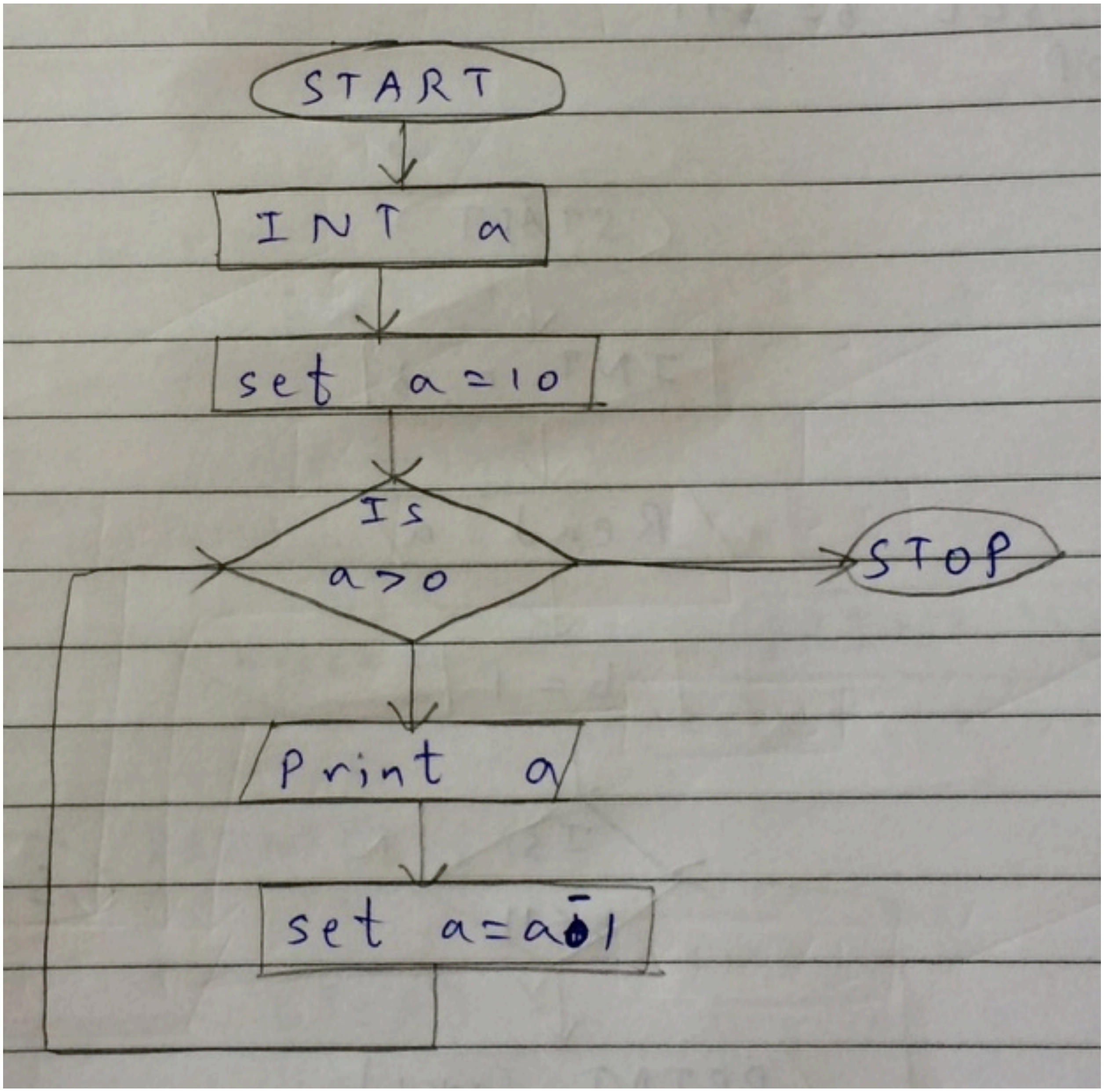


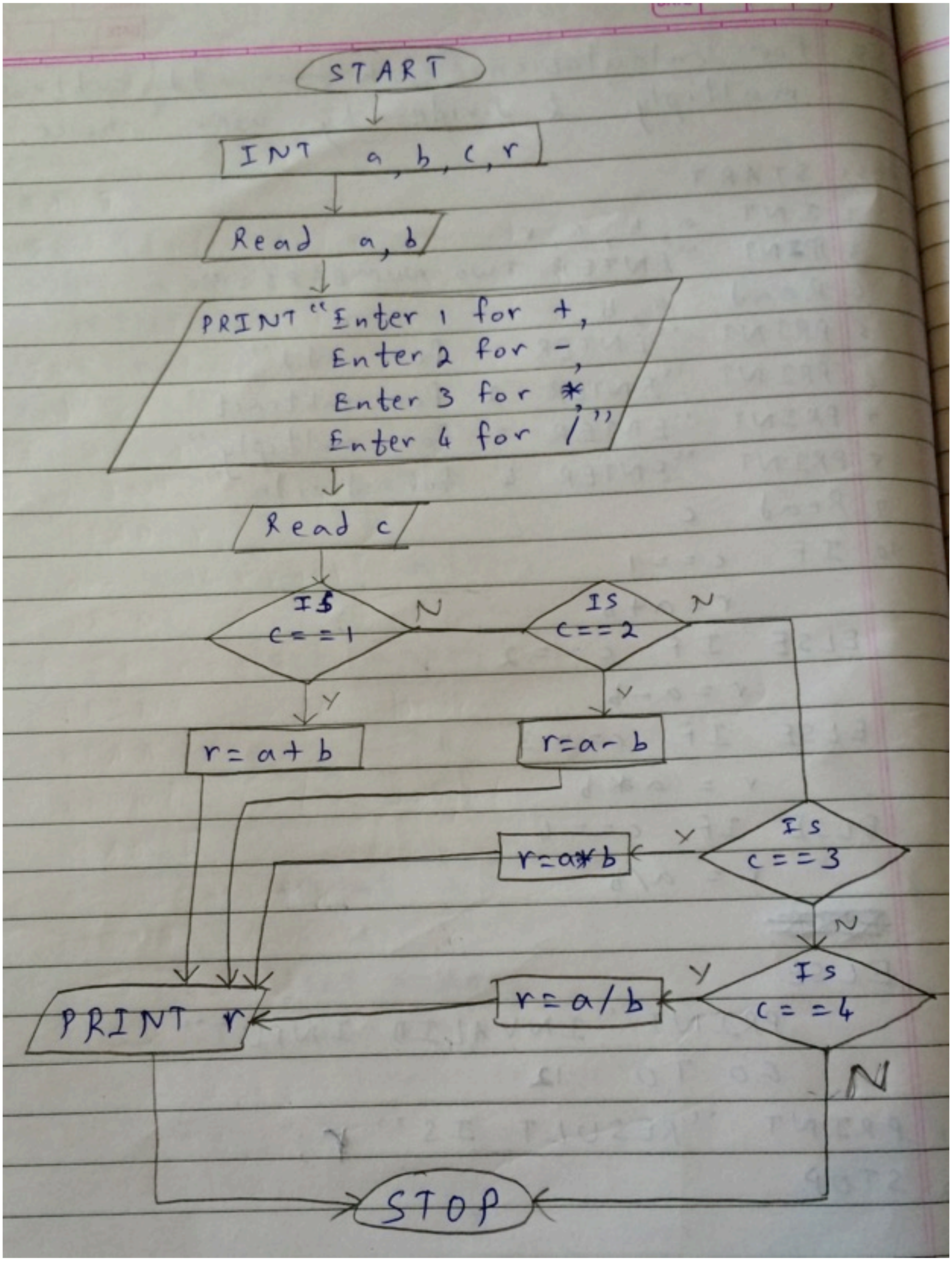
3.



4.



5.



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B.3 Conclusion:

(Students must write the conclusion as per the attainment of individual outcome listed above and learning/observation noted in section B.3)

I learnt how to write algorithm and draw flow chart.

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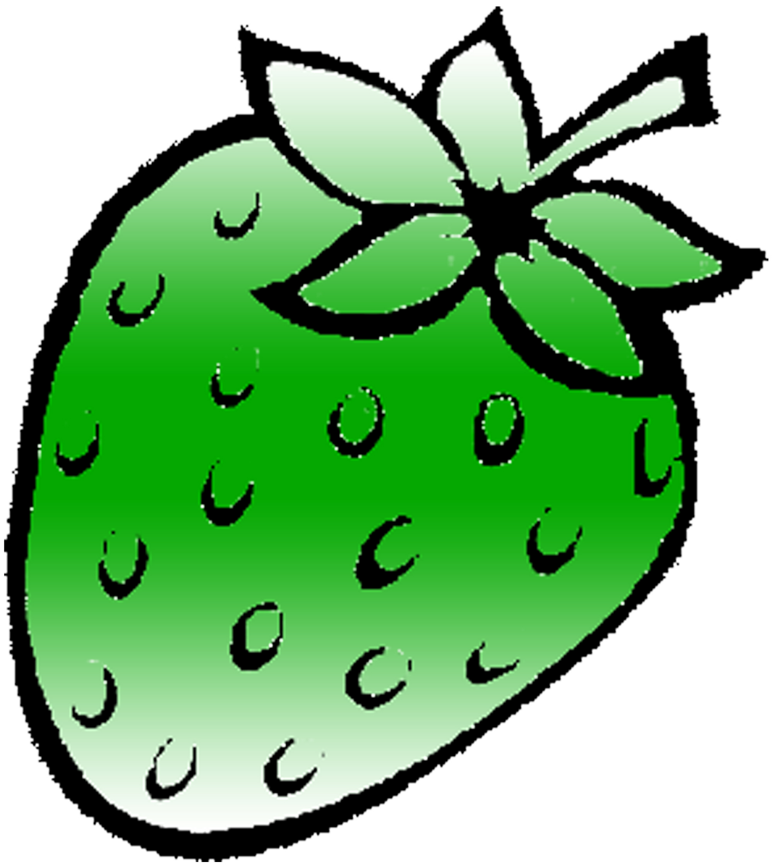

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