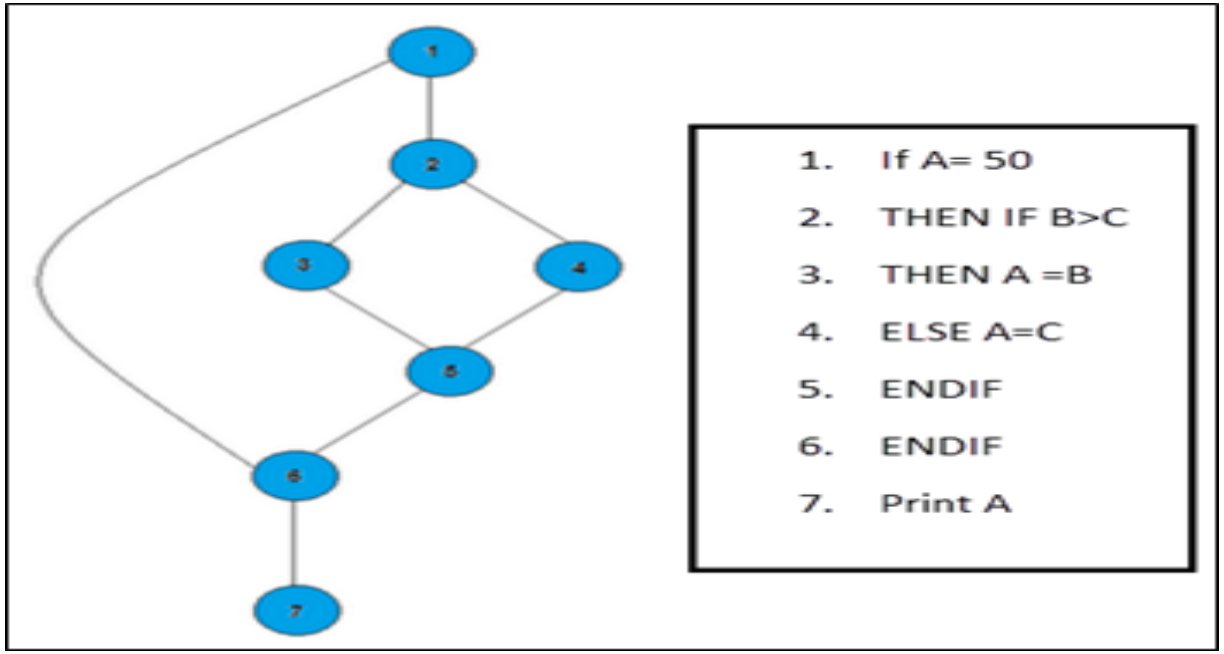
SOFTWARE TESTING

TESTING CONVENTIONAL APPLICATIONS.

Q1. Calculate the Cyclomatic Complexity (cc) value and write the paths for the following figure :



Q1-ANSWER

cc= 3 = (p+1) = (E-N+2)

Path 1: 1,2,3,5,6, 7

Path 2: 1,2,4,5,6, 7

Path 3: 1, 6, 7

Q2

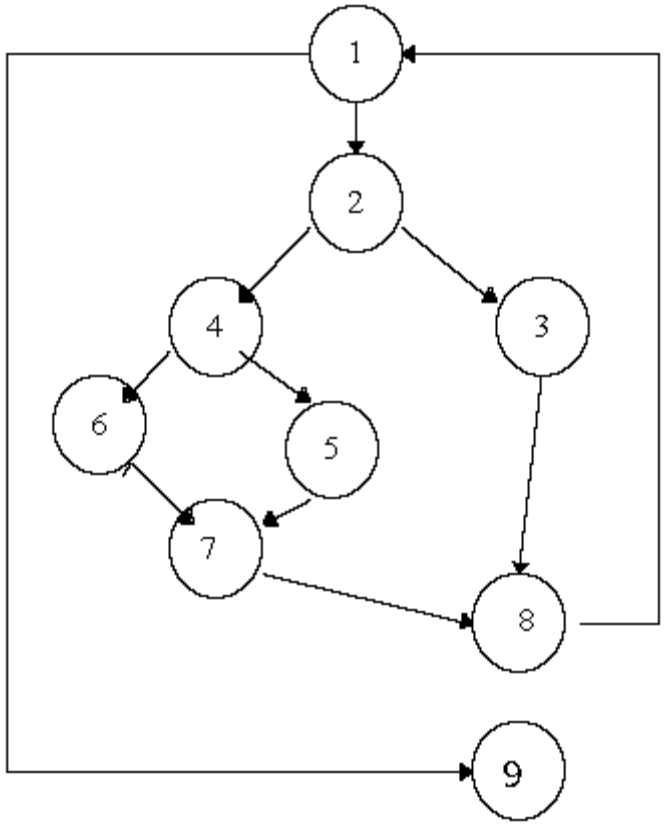
For the following code:

Draw the flow chart:

Calculate the cc and find the independent paths:

```
1:   WHILE NOT EOF LOOP
2:      Read Record;
2:      IF field1 equals 0 THEN
3:             Add field1 to Total
3:             Increment Counter
4:          ELSE
4:              IF field2 equals 0 THEN
5:                  Print Total, Counter
5:                  Reset Counter
6:              ELSE
6:                  Subtract field2 from
Total
7:              END IF
8:          END IF
8:          Print "End Record"
9:       END LOOP
9:       Print Counter
```

Q2- ANSWER




```
1:   WHILE NOT EOF LOOP
2:      Read Record;
2:      IF field1 equals 0 THEN
3:            Add field1 to Total
3:            Increment Counter
4:         ELSE
4:             IF field2 equals 0 THEN
5:                 Print Total, Counter
5:                 Reset Counter
6:             ELSE
6:                 Subtract field2 from
Total
7:             END IF
8:         END IF
8:         Print "End Record"
9:       END LOOP
9:       Print Counter
```

Q2- ANSWER

cc= 4

Independent Paths:

- 1, 9
- 1, 2, 3, 8, 1, 9
- 1, 2, 4, 5, 7, 8, 1, 9
- 1, 2, 4, 6, 7, 8, 1, 9

Q3

Myers [Mye79] uses the following program as a self-assessment for your ability to specify adequate testing: A program reads three integer values. The three values are interpreted as representing the lengths of the sides of a triangle. The program prints a message that states whether the triangle is scalene, isosceles, or equilateral. Develop a set of test cases that you feel will adequately test this program.

Q3 - ANSWER

The program reads three integer values. The three values are interpreted as representing the lengths of the sides of a triangle.

Test Cases:

T1. scalene triangle (the lengths of the sides of the triangle are different)

T2. isosceles triangle (the two lengths of the sides of the triangle are equal and side length is different)

T3. equilateral triangle (the lengths of the sides of the triangle are equal)

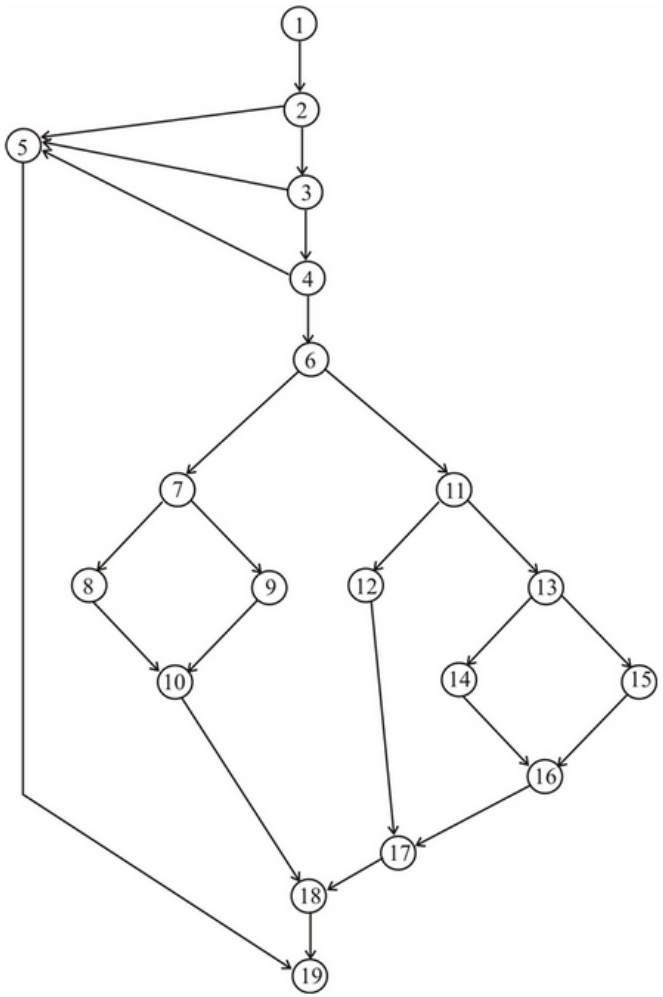
Q3 - ANSWER

Test case	Test data	Expected output	Result	Pass/Fail
T1	2,3,4	The program displays a message stating that the triangle is scalene.	triangle is scalene	Pass
T2	3,3,4	The program displays a message stating that the triangle is isosceles.	triangle is isosceles	Pass
T3	3,3,3	The program displays a message stating that the triangle is equilateral.	triangle is equilateral	Pass

Q4

Design and implement the program (with error handling where appropriate) specified in Q3. Derive a flow graph for the program and apply basis path testing to develop test cases that will guarantee that all statements in the program have been tested. Execute the cases and show your results.

```
int a,b,c;                1
read (a,b,c);             1
     2          3         4
if( (a<0) || (b<0) || (c<0) )
   print("sides must be positive")  5
else
   if(a==b)    6
      if(b==c)  7
         print("triangle is  equilateral")    8
      else
         print("triangle is  isosceles")      9
      end if   10
  else
      if(b==c) 11
         print("triangle is  isosceles")  12
      else
         if (a==c)  13
            print("triangle is  isosceles")  14
         else
            print("triangle is  scalene")  15
         end if 16
         end if  17
   end if  18
end if  19
```



Q4- ANSWER

Cc = P + 1
= 7 + 1 = 8

P1: 1, 2, 5, 19
P2: 1, 2, 3, 5, 19
P3: 1, 2, 3, 4, 5, 19
P4: 1, 2, 3, 4, 6, 7, 8, 10, 18, 19
P5: 1, 2, 3, 4, 6, 7, 9, 10, 18, 19
P6: 1, 2, 3, 4, 6, 11, 12, 17, 18, 19
P7: 1, 2, 3, 4, 6, 11, 13, 14, 16, 17, 18, 19
P8: 1, 2, 3, 4, 6, 11, 13, 15, 16, 17, 18, 19

Q4- ANSWER

Test path	Test data	Expected output	Result	Pass/Fail
P1	-1,2,3	The program displays error message stating that the sides must be positive.	the sides must be positive.	Pass
P2	1,-2,3	The program displays error message stating that the sides must be positive.	the sides must be positive.	Pass
P3	1,2,-3	The program displays error message stating that the sides must be positive.	the sides must be positive.	Pass
P4	2,2,2	The program displays a message stating that the triangle is equilateral.	triangle is equilateral	Pass

Q4- ANSWER

Test path	Test data	Expected output	Result	Pass/Fail
P5	2,2,3	The program displays a message stating that the triangle is isosceles.	triangle is isosceles	Pass
P6	2,3,3	The program displays a message stating that the triangle is isosceles.	triangle is isosceles	Pass
P7	2,3,2	The program displays a message stating that the triangle is isosceles.	triangle is isosceles	Pass
P8	2,3,4	The program displays a message stating that the triangle is scalene.	triangle is scalene	Pass