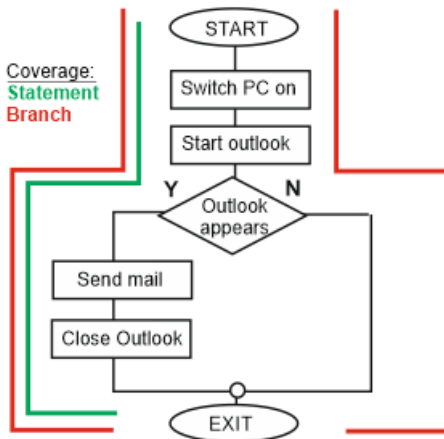# Test Design Techniques – White Box

TASK-01

Given the following:

```
Switch PC on
Start "outlook"
IF outlook appears THEN
Send an email
Close outlook
```
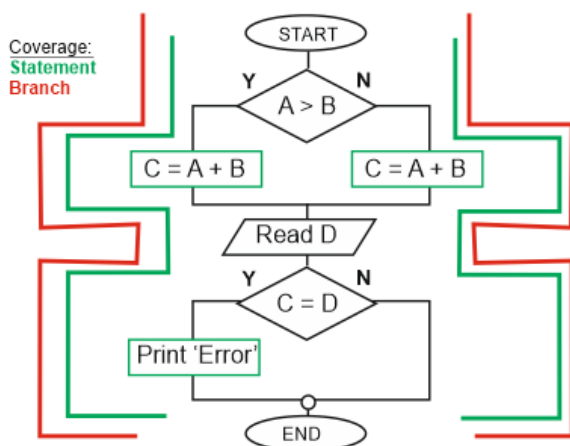

Coverage:
Statement
Branch

(a) 1 test for statement coverage, 1 – for branch coverage.
(b) 1 test for statement coverage, 2 – for branch coverage. ←
(c) 1 test for statement coverage, 3 – for branch coverage.
(d) 2 tests for statement coverage, 2 – for branch coverage.
(e) 2 tests for statement coverage, 3 – for branch coverage.

TASK-02

Given the following code, which is true:

```
IF A > B THEN
C = A + B
ELSE
C = A + B
ENDIF
Read D
IF C = D Then
Print "Error"
ENDIF
```


Coverage:
Statement
Branch

(a) 1 test for statement coverage, 3 – for branch coverage.
(b) 2 tests for statement coverage, 2 – for branch coverage. ←
(c) 2 tests for statement coverage, 3 – for branch coverage.
(d) 3 tests for statement coverage, 3 – for branch coverage.
(e) 3 tests for statement coverage, 2 – for branch coverage.

TASK-03

How many test cases are needed to achieve 100 % decision coverage?

```
If (p = q) {
s = s + 1;
if (a < S) {
t = 10;
}
} else if (p > q) {
t = 5;
}
```
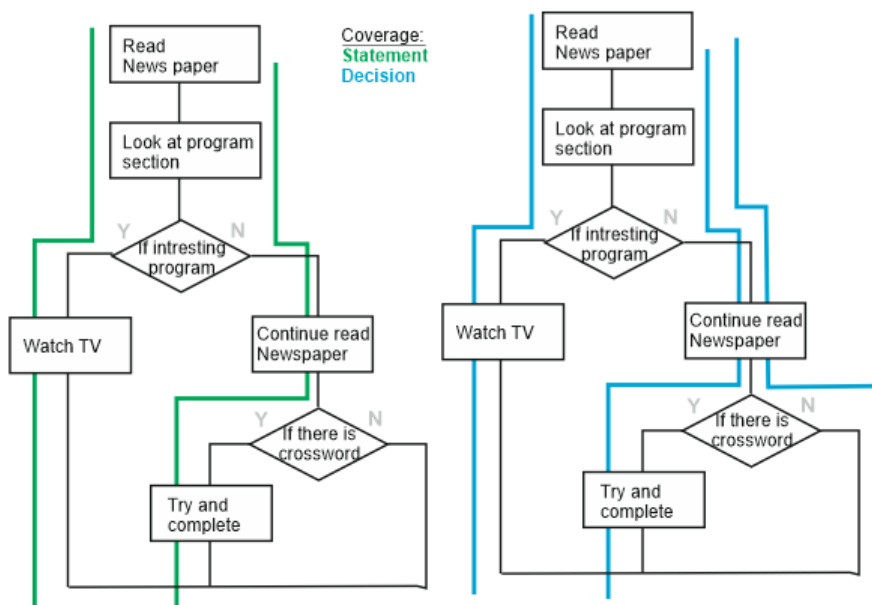

Coverage:
Case 1
Case 2
Case 3
Case 4
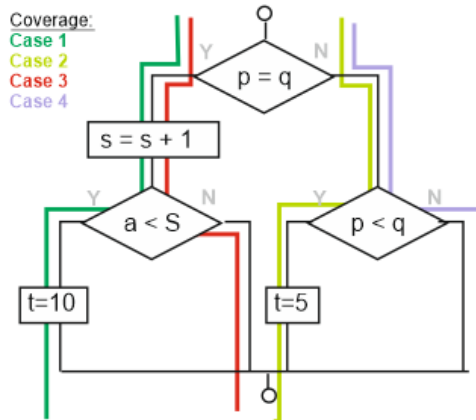
(a) 3
(b) 6
(c) 5
(d) 4 ←

TASK-04

Consider the following:

- Pick up and read the newspaper
- Look at what is on television
- If there is a program that you are interested in watching then switch the the television on and watch the program
- Otherwise
- Continue reading the newspaper
- If there is a crossword in the newspaper then try and complete the crossword

Coverage:
Statement
Decision

(a) SC = 1 and DC = 1
(b) SC = 1 and DC = 2
(c) SC = 1 and DC = 3
(d) SC = 2 and DC = 2
(e) SC = 2 and DC = 3 ←

TASK-05

Given the following code, which is true about the minimum number of test cases required for full statement and branch coverage:

```
Read P
Read Q
IF P + Q > 100 THEN
Print "Large"
ENDIF
IF P > 50 THEN
Print "P Large"
ENDIF
```
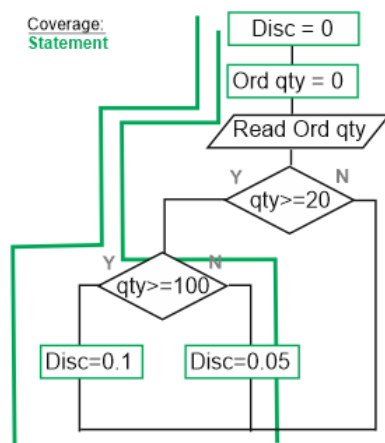

Coverage:
Statement
Branch

Read P
Read Q
Y / N
P+Q>100
Print 'Large'
Y / N
P>50
Print 'P Large'
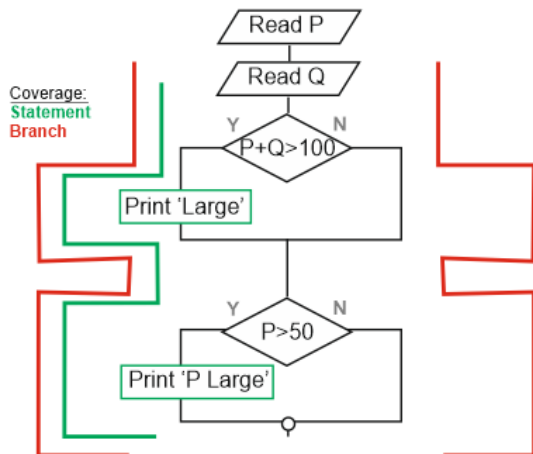
(a) 1 test for statement coverage, 3 – for branch coverage.
(b) 1 tests for statement coverage, 2 – for branch coverage. ←
(c) 1 test for statement coverage, 1 – for branch coverage.
(d) 2 tests for statement coverage, 3 – for branch coverage.
(e) 2 tests for statement coverage, 2 – for branch coverage.

TASK-06

Minimum Test Required for Statement Coverage:

```
Disk = 0
Order-qty = 0
Read Order-qty
IF Order-qty >= 20 THEN
Disc = 0.05
IF Order-qty >= 100 THEN
Disc = 0.1
End IF
End IF
```
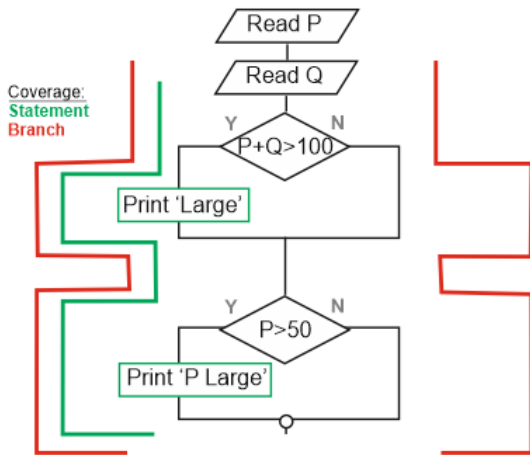

Coverage:
Statement

Disc = 0
Ord qty = 0
Read Ord qty
Y / N
qty>=20
Y / N
qty>=100
Disc=0.1   Disc=0.05

(a) Statement coverage is 4
(b) Statement coverage is 1
(c) Statement coverage is 3
(d) Statement coverage is 2 ←

TASK-07

Minimum Tests Required for Statement Coverage and Branch Coverage:

```
Read P
Read Q
IF P + Q > 100 THEN
Print "Large"
End IF
IF p > 50 THEN
Print "pLarge"
End IF
```
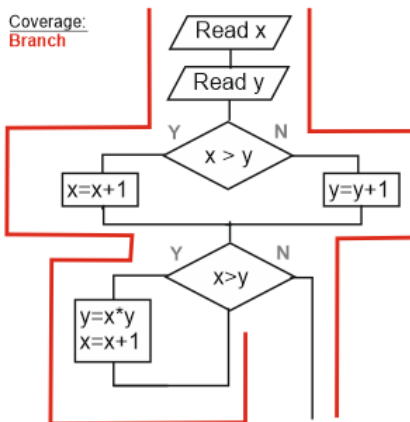

(a) Statement coverage is 2, Branch Coverage is 2.
(b) Statement coverage is 3, Branch Coverage is 2.
(c) Statement coverage is 1, Branch Coverage is 2. ←
(d) Statement coverage is 4, Branch Coverage is 2.

TASK-08

What is the smallest number of test cases required to Provide 100% branch coverage?

```
IF (x > y) x = x + 1;
ELSE y = y + 1;
WHILE (x > y)
{
y = x * y; x = x + 1;
}
```


(a) 1
(b) 2 ←
(c) 3
(d) 4

TASK-09

If a program is tested and 100% branch coverage is achieved, which of the following coverage criteria is then guaranteed to be achieved?
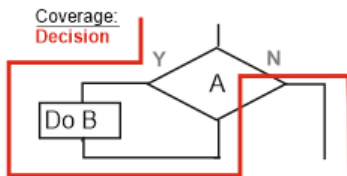**(a)** 100% Equivalence class coverage
(b) 100% Condition coverage and 100% Statement coverage ←
(c) 100% Statement coverage
(d) 100% Multiple Condition coverage

TASK-10

This part of a program is given:

```
WHILE (condition A) Do B
END WHILE
```

How many decisions should be tested in this code in order to achieve 100% decision coverage?
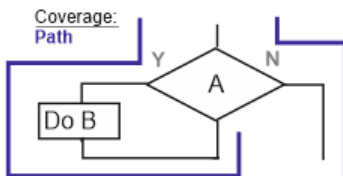

(a) 2
(b) Indefined
(c) 1 ←
(d) 4

TASK-11

This part of a program is given:

```
WHILE (condition A) Do B
END WHILE
```

How many paths should be tested in this code in order to achieve 100% path coverage?

(a) 1
(b) Indefined
(c) 2 ←
(d) 4

TASK-12

If a program is tested and 100% condition coverage is achieved, which of the following coverage criteria is then guaranteed to be achieved?
(a) 100% Branch coverage
(b) 100% Condition coverage and 100% Statement coverage ←
(c) Equivalence Class and Boundary Value coverage
(d) No other white box coverage criterion is guaranteed to be fulfilled 100%

TASK-13

Branch coverage:
(a) Another name for Decision coverage ←
(b) Another name for All-Edges coverage
(c) Another name for Basic Path coverage
(d) All the above

TASK-14

Which of the following statements is NOT correct?

(a) A minimal test set that achieves 100% LCSAJ coverage will also achieve 100% Branch coverage.
(b) A minimal test set that achieves 100% Path coverage will also achieve 100% Statement coverage.
(c) A minimal test set that achieves 100% Path coverage will generally detect more faults than one that achieves 100% Statement coverage.
(d) A minimal test set that achieves 100% Statement coverage will generally detect more faults than one that achieves 100% Branch coverage. ←

TASK-15

Analyze the following highly simplified procedure:

```
Ask: "What type of ticket do you require, single or return?"
IF the customer wants "return"
Ask: "What rate? Standard or Cheap-day?"
IF the customer replies "Cheap-day"
Say: "That will be 11.20"
ELSE
Say: "That will be 19.50"
ENDIF
ELSE
Say: "That will be 9.75"
ENDIF
```

Now decide the minimum number of tests that are needed to ensure that all the questions have been asked, all combinations have occurred and all replies given:
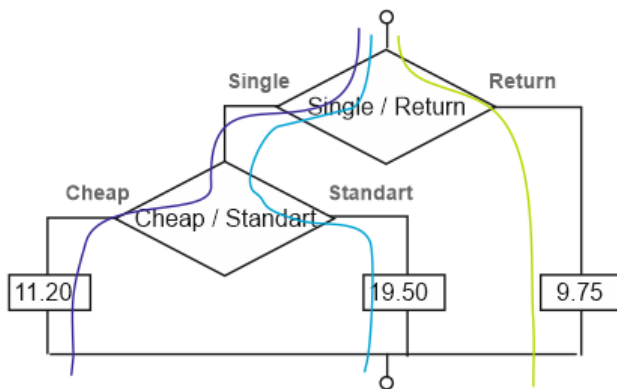
(a) 3 ←
(b) 4
(c) 5
**(d)** 6

TASK-16

Consider the following statements:

I.   100% Statement coverage guarantees 100% Branch coverage.
II. 100% Branch coverage guarantees 100% Statement coverage.
III. 100% Branch coverage guarantees 100% Decision coverage.
IV. 100% Decision coverage guarantees 100% Branch coverage.
V.   100% Statement coverage guarantees 100% Decision coverage.

(a) II is True;   I, III, IV & V are False
(b) I & V are True;   II, III & IV are False
(c) II & III are True;   I, IV & V are False
(d) II, III & IV are True;   I & V are False ←

TASK-17

Given the following code, which statement is true about the minimum number of test cases required for full Statement and Branch coverage?

```
Read p
Read q
IF p + q > 100 THEN
Print "Large"
ENDIF
IF p > 50 THEN
Print "pLarge"
ENDIF
```
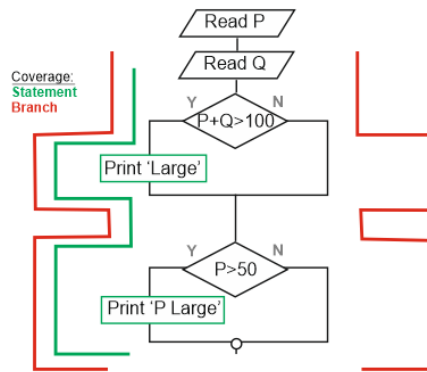

(a) 1 test for statement coverage, 3 – for branch coverage.
(b) 1 tests for statement coverage, 2 – for branch coverage. ←
(c) 1 tests for statement coverage, 1 – for branch coverage.
(d) 2 tests for statement coverage, 2 – for branch coverage.

TASK-18

How many test cases are needed to achieve 100 % condition coverage?

```
if ((temperature < 0) or
(temperature > 100)) {
alert ("DANGER");
if ((speed > 100) and (load <=50)) {
speed = 50;
}
} else {
Check = false;
}
```

(a) 5 ←
(b) 4
(c) 2
(d) 3

TASK-19

For the following piece of code, how many test cases are needed to get 100% statement coverage?

```
Procedure XRead (Color) // Input color from user
IF (Color == "Red") THEN
Call Roses(Color)
ELSEIF (Color == "Blue") THEN
Call Violets(Color)
ELSE
PRINT "User is no Shakespeare"
SaveToDatabase(Color)
End Procedure X
```
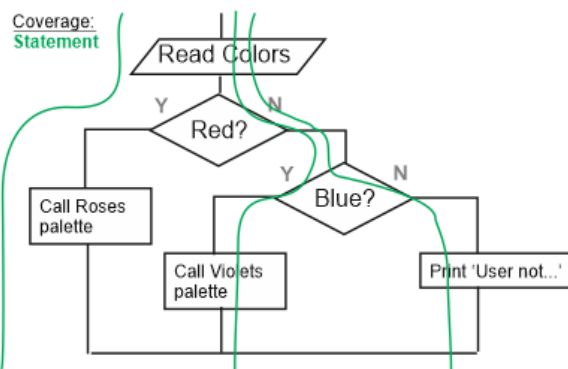

**(a)** 5
(b) 3 ←
(c) 1
(d) 2

TASK-20

If you are flying with an economy ticket, there is a possibility that you may get upgraded to business class, especially if you hold a gold card in the airline's frequent flier program. If you don't hold a gold card, there is a possibility that you will get 'bumped' off the flight if it is full and you check in late. This is shown in following igure. Note that each box (i.e. statement) has been numbered.

CONTROL FLOW DIAGRAM FOR FLIGHT CHECK-IN
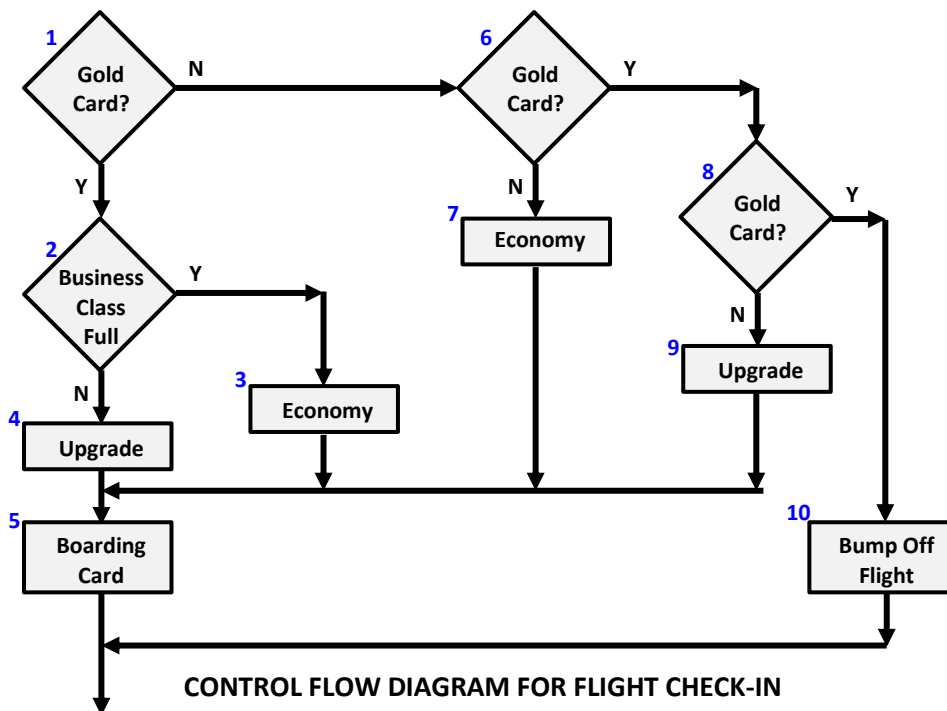
Three tests have been run:

- Test 1: Gold card holder who gets upgraded to business class
- Test 2: Non-gold card holder who stays in economy
- Test 3: A person who is bumped from the flight

What is the statement coverage of these three tests?

CONTROL FLOW DIAGRAM FOR FLIGHT CHECK-IN

Test-1   Test-2   Test-3
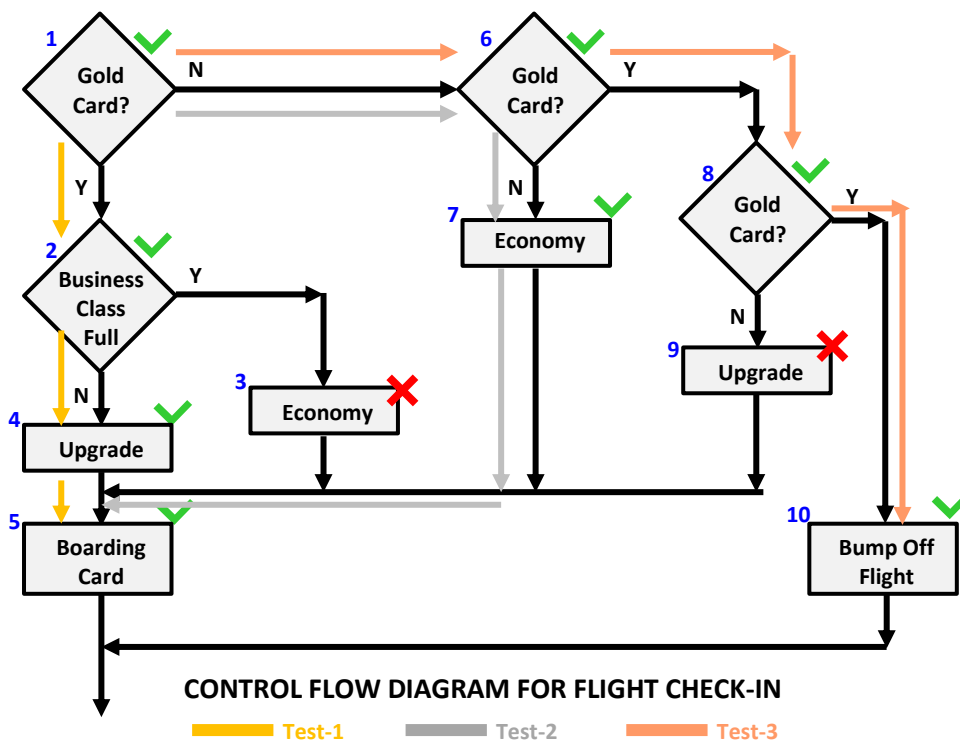
✔ → **8 of 10**

(a) 60%
(b) 70%
(c) 80% ←
(d) 90%

TASK-21

Given the following sample of pseudo code:

```
01   Input number of male rabbits
02   Input number of female rabbits
03   If mail rabbits > 0 and female rabbits > 0 then
04      Input Do you want to breed (Yes/No)
05      If breed = "No"
06          Print "Keep male and female rabbits apart!"
07      End If
08   End If
```

Which of the following test cases will ensure that statement "06" is executed?
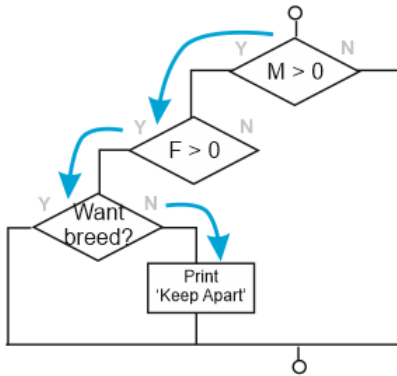
(a) male rabbits = 1, female rabbits = 1, breed = "yes"
(b) male rabbits = 1, female rabbits = 1, breed = "no" ←
(c) male rabbits = 1, female rabbits = 2, breed = "yes"
**(d)** male rabbits = 1, female rabbits = 0, breed = "no"

TASK-22

A system under development contains complex calculations and decision logic, and it is assessed as high risk because of the relative inexperience of the development team in the application domain. Which of the following would be the MST appropriate choice of test design technique for component testing?
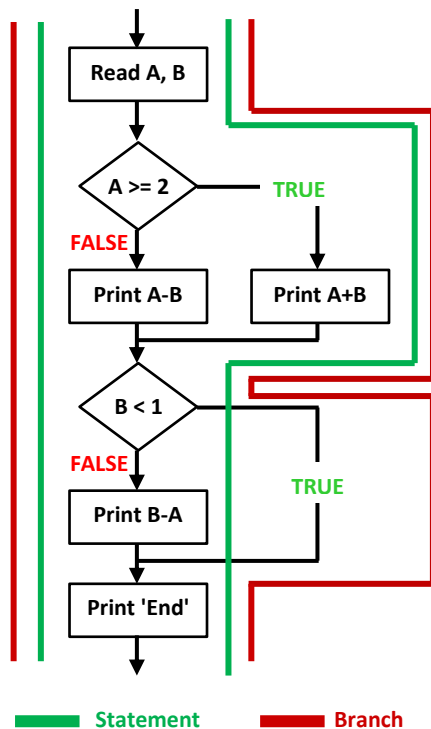
(a) Decision testing ←
(b) Statement testing
(c) State transition testing
(d) Equivalence Partitioning

TASK-23

Given the following flow chart diagram:
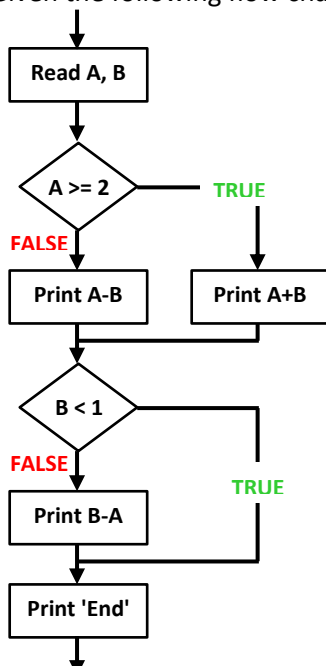
What is the minimum number of test cases required for 100% statement coverage and 100%decision coverage, respectively?

(a) Statement coverage = 1, Decision coverage = 3
(b) Statement coverage = 2, Decision coverage = 3
(c) Statement coverage = 2, Decision coverage = 2 ←
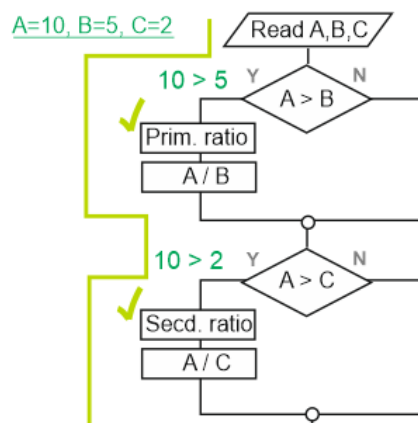**(d)** Statement coverage = 3, Decision coverage = 3

TASK-24

24. Given the following sample of pseudo code:

```
Read A, B, C;
If A > B then
Print "Primary ratio is" & A/B;
End If
If A > C then
Print "Secondary ratio is" & A/C;
End If
```

Which of the following test cases would achieve 100% statement coverage?

(a) A = 5, B = 10 and C = 2
(b) A = 10, B = 10 and C = 10
(c) A = 10, B = 5 and C = 2 ←
(d) A = 2, B = 5 and C = 10