Structure-based or white-box techniques

Overview

This supplementary worksheet contains questions regarding 'Statement' and 'Branch Decision' testing which will appear in the actual exam. Many candidates have problems fully understanding the concepts involved, but by being able to successfully complete the example questions below, the candidate should have an increased possibility of getting the answer right in the real exam.

1 Practice Questions

Question 1:

Ask: “What type of bread do you require, white or brown?”

IF the customer wants ‘brown’

    Ask: “Which type, sliced or un-sliced?”

    IF the customer replies ‘un-sliced’

        Say: “That will be 95p”

    ELSE

        Say: “That will be 65p”

    ENDIF

ELSE

    Say: “That will be 75p”

ENDIF

How many tests are required to achieve full Branch Coverage?

a) 3
b) 4
c) 5
d) 6

Question 2:

Which statement is true regarding the minimum number of test cases required for full statement and branch coverage?

```
Read G
Read K
IF G + K > 80 THEN
    Print "The value is quite large"
ENDIF
IF G > 50 THEN
    Print "G is a large value"
ENDIF
```

a) 1 test for statement coverage, 1 for branch coverage
b) 1 test for statement coverage, 2 for branch coverage
c) 2 test for statement coverage, 1 for branch coverage
d) 2 tests for statement coverage, 2 for branch coverage

Question 3:

If the code below was part of a program, how many tests are required to achieve 100% statement coverage?

```
If A = 3 then
        Display_message A;
            If B = 2 then
                Display_message B;
            Else
                Display_message C;
Else
        Display_message D;
```

a). 1
b). 2
c). 3
d). 4

Question 4:

If the code below was part of a program, how many tests are required to achieve 100% branch/decision coverage?

```
If A = 3 then
        Display_message A;
            If B = 2 then
                Display_message B;
            Else
                Display_message C;
Else
        Display_message C;
```

a). 1
b). 2
c). 3
d). 4

Question 5:

If the code below was part of a program, how many tests are required to achieve 100% statement coverage?

```
Read A
Read B
IF A<0 THEN
Print "A negative"
ENDIF
IF B<0 THEN
Print "B negative"
ENDIF
```

a). 1
b). 2
c). 3
d). 4

Question 6:

```
Ask: “Are you a male or a female?”
IF the person says ‘female’
    Ask: “Are you married or single?”
    IF the person says ‘Single’
        Say: “Start your name with Miss”
    ELSE
        Say: “Start your name with Mrs”
    ENDIF
ELSE
    Say: “Start your name with ‘Mr.”
ENDIF
```

How many tests are required to achieve full Branch Coverage?
a) 4
b) 3
c) 5
d) 6

Question 7:

If the code below was part of a program, how many tests are required to achieve 100% statement coverage?

```
Read A
IF A<0 THEN
Print "A negative"
ENDIF
IF A>0 THEN
Print "A positive"
ENDIF
```

a). 1
b). 2
c). 3
d). 4

2 Answers

Question 1:

Ask: “What type of bread do you require, white or brown?”

IF the customer wants ‘brown’

    Ask: “Which type, sliced or un-sliced?”

    IF the customer replies ‘un-sliced’

        Say: “That will be 95p”

    ELSE

        Say: “That will be 65p”

    ENDIF

ELSE

    Say: “That will be 75p”

ENDIF

How many tests are required to achieve full Branch Coverage?

a) 3

b) 4

c) 5

d) 6

The correct answer is **A**:

Test case 1: The customer asks for brown and sliced bread

Test case 2: The customer asks for brown and un-sliced bread

Test case 3: The customer asks for white bread

Question 2:

Which statement is true regarding the minimum number of test cases required for full statement and branch coverage?

```
Read G
Read K
IF G + K > 80 THEN
    Print "The value is quite large"
ENDIF
IF G > 50 THEN
    Print "G is a large value"
ENDIF
```

a) 1 test for statement coverage, 1 for branch coverage
b) 1 test for statement coverage, 2 for branch coverage
c) 2 test for statement coverage, 1 for branch coverage
d) 2 tests for statement coverage, 2 for branch coverage

The correct answer is **B**:

Test case 1: G=60, K=30 which exercises both of the 'Print' statements

Test case 2: G=60, K=30 which tests the 'true' outcomes of the 'IF' statements

Test case 3: G=49, K=30 which tests the 'false' outcomes of the 'IF' statements

Question 3:

If the code below was part of a program, how many tests are required to achieve 100% statement coverage?

```
If A = 3 then
        Display_message A;
            If B = 2 then
                Display_message B;
            Else
                Display_message C;
Else
        Display_message D;
```

a). 1
b). 2
c). 3
d). 4

The correct answer is **C**:

Test case 1: A=3, B=2 which would display message A and message B

Test case 2: A=3, B=1 which would display message A and message C

Test case 3: A=4, B=2 which would display message D

Question 4:

If the code below was part of a program, how many tests are required to achieve 100% branch/decision coverage?

```
If A = 3 then
        Display_message A;
            If B = 2 then
                Display_message B;
            Else
                Display_message C;
Else
        Display_message C;
```

a). 1
b). 2
c). 3
d). 4

The correct answer is **C**:

Test case 1: A=3, B=2 which tests the 'true' outcomes of the 'IF' statements

Test case 2: A=4, B=4 which tests the 'false' outcomes of the first 'IF' statement

Test case 2: A=3, B=4 which tests the 'false' outcome of the second 'IF' statement

Question 5:

If the code below was part of a program, how many tests are required to achieve 100% statement coverage?

```
Read A
Read B
IF A<0 THEN
Print "A negative"
ENDIF
IF B<0 THEN
Print "B negative"
ENDIF
```

a). 1
b). 2
c). 3
d). 4

The correct answer is **A**:

Test case 1: A= -4, B= -5 which exercises both of the 'Print' statements

Question 6:

Ask: “Are you a male or a female?”

IF the person says ‘female’

    Ask: “Are you married or single?”

    IF the person says ‘Single’

        Say: “Start your name with Miss”

    ELSE

        Say: “Start your name with Mrs”

    ENDIF

ELSE

    Say: “Start your name with ‘Mr.”

ENDIF

How many tests are required to achieve full Branch Coverage?

a) 4

b) 3

c) 5

d) 6

The correct answer is **B**:

Test case 1: ‘Male’ which tests the ‘false’ outcome of the first ‘IF’ statement

Test case 2: ‘Female & Married’ which tests the ‘false’ outcome of the second ‘IF’ statement, and also the ‘true’ outcome of the first ‘IF’ statement

Test case 3: ‘Female & Single’ which tests the ‘true’ outcome of the second ‘IF’ statement

Question 7:

If the code below was part of a program, how many tests are required to achieve 100% statement coverage?

```
Read A
IF A<0 THEN
Print "A negative"
ENDIF
IF A>0 THEN
Print "A positive"
ENDIF
```

a). 1
b). 2
c). 3
d). 4

The correct answer is **B**:

Test case 1: A= -4, which exercises the first 'Print' statement

Test case 2: A= 4, which exercises the second 'Print' statement

3 Pre-test Tips

Here are some ideas on how to calculate the amount of 'Statement' and 'Branch Decision' test cases quickly and efficiently, which can be used in our examples, and more importantly in the real exam.

Statements:

1) Go through the example code and note down all of the 'executable' statements. *(In the exam these will normally be 'Print' statements).*
2) Work out what will need to occur to execute these statements.
3) Now calculate the minimum amount of test cases required to achieve this.

Branch Decisions:

1) Go through the example code and note down all of the 'IF' decisions.
2) Now note down all of the 'True' outcomes of the 'IF' decisions
3) Now note down all of the 'False' outcomes of the 'IF' decisions
4) Now calculate the minimum amount of test cases required to exercise all of the decisions.