

計算機程式設計 111 學年度第 1 學期小考 2

系級：_____ 學號：_____ 姓名：_____

1. 請簡要回答以下問題。(Please write down your answer briefly)

(1) 單元測試的重點為何? (What is the key point of unit test?)

設計足夠多的測試案例，滿足各種問題條件

正確：測試主程式讓結果正確

完整：測試主程式，使涵蓋度達到 100%

(2) 單元測試有什麼步驟? (What is the step of unit test?)

設計測試案例、撰寫測試(驅動)程式、執行測試

(3) 什麼是 branch coverage 以及 instruction coverage?

(What is branch coverage and instruction coverage of unit test?)

branch coverage: 程式中的每個分支 T/F 是否都有覆蓋

instruction coverage: 程式中的每個指令是否覆蓋

(4) 使用 python code coverage 套件，coverage 所產生的 html 報表中，綠色、黃色及紅色各自代表什麼意思? (In the html report generated by the coverage package. Describe the representation of the green, yellow, and red respectively.)

綠色: 指令有被充分測試到

黃色: 條件判斷 T/F 指令，部分被測試到

紅色: 指令沒被測試到

2. (1) (a,b) = 20, 24 (2) (a,b) = 21, 33 (3) (a,b) = 19, 36

請考慮 myTestCase(a, b) 的各種條件及情境，為此程式設計測試資料，使得程式的 Coverage 能夠達到 100%。(Please consider various conditions and situations to design the test data for "myTestCase(a,b)", in order to achieve 100% coverage.)

(4). 已知 myTestCase(5, 66) 沒有達到 100% Branch coverage，請說明為何該筆測試資料沒有達到 100% Branch coverage。(It's known that "myTestCase(5, 66)" does not achieve 100% branch coverage, Please explain why the test data does not achieve 100% branch coverage)

因為 a = 5, 使得 counter 從未累加到 3，因此 if counter == 3 為 true 的狀況在 myTest(5, 66) 永遠不會發生。

```
01 def myTestCase(a, b):
02     counter = 0
03     sum = 0
04     while a != 1:
05         if counter == 3:
06             print("counter has reached three")
07             counter = 0
08         if b % 3 == 0 and a < 100:
09             sum = b - 1
10             b = b + 1
11         if a % 2 == 0 and b < 100:
12             sum += a
13             counter += 1
14             a /= 2
15             continue
16         a -= 1
17     print("sum is", sum)
```

3. (1) level <= n (2) number + 1 (3) number > level
請完成以下程式碼，使執行會正確印出下方圖形。(The result of following program will print out the pattern below. Please complete the codes in the empty spaces.)

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

```
01 def printTriangle(n):
02     number = 1
03     level = 1
04     while (1):
05         print("%2d" % number, end=" ")
06         number = (2)
07         if (3):
08             number = 1
09             level = level + 1
10             print()
11
12     printTriangle(5)
```

4. (1) n - x - 1 (2) x * n + y (3) n * n

請完成以下程式碼，使執行會正確印出 n * n 數字矩陣:

(The following program will print out the pattern below by printSquareWithT(). Please complete the empty spaces.)

程式執行結果 (The result of following program is):

```
20 21 22 23 24
15 16 17 18 19
10 11 12 13 14
5 6 7 8 9
0 1 2 3 4
```

```
01 def turnInto(i, n):
02     x = i // n
03     y = i % n
04     x = (1)
05     return (2)
06
07 def printSquareWithT(n):
08     i = 0
09     while i < (3):
10         print("%3d" % turnInto(i, n), end=" ")
11         i = i + 1
12         if i % n == 0:
13             print()
14
15     printSquareWithT(5)
```

5. (1) n - x - 1 (2) 2*(n - x)

請完成以下程式碼，使執行會正確印出結果圖形。(The following program will print out the pattern below, please complete the empty spaces)

執行結果為 (The result of following program is):

```
864202468
^6420246
^^42024
^^^202
^^^^0
```

```
01 def printOneRow(m, n, s, mark):
02     for y in range(m, n, s):
03         if mark.isdigit():
04             print(y, end=" ")
05         else:
06             print(mark, end=" ")
07
08 def myPrint(n):
09     for x in range(0, n):
10         printOneRow(0, x, 1, '^')
11         printOneRow(2*(1), -1, -2, '0')
12         printOneRow(2, (2), 2, '0')
13     print()
14     myPrint(5)
```

6. (1) Line 1: 124164 (2) Line 2: 164
以下程式，輸出為何? (The following program will execute test06(12), please write down the output of test06(12).)

```

01 def test06(num):
02     total = 100
03     i = 6
04     while i < num:
05         if i%4 == 2:
06             total += i*4
07             print(total, end="")
08             i += 2
09         print("\n'+str(total))
10     test06(12)

```

7. 下方有一程式 PrintWithNestLoop，請回答下列的問題
(The following program is PrintWithNestLoop(). Please answer the questions below.)

```

01 def PrintWithNestLoop(num):
02     for x in range(1, num+1):
03         for y in range(num, x, -1):
04             s = '{0},{1}'.format(x,y)
05             print(s, end='#')
06         for y in range(1, 2*x, 1):
07             s = '{0},{1}'.format(x,y)
08             print(s, end=',')
09         print()
10     PrintWithNestLoop(3)

```

- (1) 請寫出程式結果為何，輸出分為 3 行 (Please write out the result of program, The output is divided to 3 lines)

Line 1: (1,3)#(1,2)#(1,1).

Line 2: (2,3)#(2,1),(2,2),(2,3).

Line 3: (3,1),(3,2),(3,3),(3,4),(3,5).

c),

- (2) 03-04-05-03-06-07-08-06-07-08

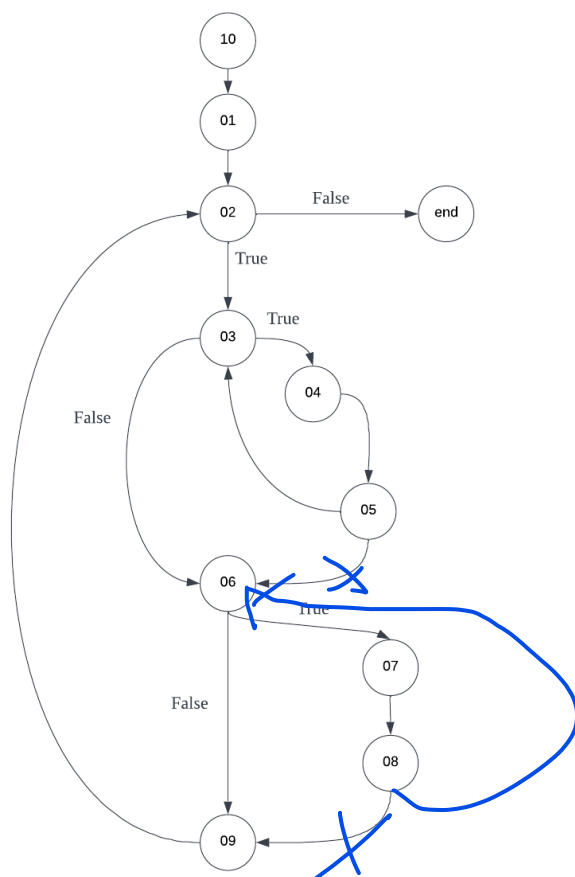
請寫出 PrintWithNestLoop(3)的執行編號順序(Please write the executing sequence number for PrintWithNestLoop(3).)

10-01-02-03-04-05-03-04-05-03-06-07-08-06-09-02-

(2)

-06-07-08-06-09-02-03-06-07-08-06-07-08-06-07-08-06-09-02

- (3) 請畫出 PrintWithNestLoop() 的流程圖 (Draw the flow chart of the PrintWithNestLoop().)



8. (1) <class 'int'> (2) 2 (3) 42

以下程式將會執行 test，請填入執行結果。

(The following program will execute test(), please write down the output of test().)

```

01 def summation(n):
02     total = 0
03     for i in range(n+3, 1, -2):
04         if i % 2 == 0:
05             total += i
06         else:
07             total -= i
08     return total, i
09
10 def test():
11     result, n = summation(9)
12     print(type(result))      #(1)
13     print(n)                 #(2)
14     print(result)            #(3)
15
16 test()

```

9. (1) Line 2: 14 10 (2) Line 3: 14 10
請寫出程式執行後輸出的指定輸出列為何? (Please write out the specific output line of program after executed.)

```

01 def go(m, n):
02     i=0
03     while (True):
04         m = m + i
05         if (m > n):
06             break
07         print(m, i)
08         if (m < 8):
09             i = i + 10
10             continue
11         print(m, i)
12         i = i + 5
13         print(m, i)
14     go(4, 19)

```

- (3) B 請問針對"go(m, n)", 哪一個測試案例可以達到 100% instruction coverage?

(Which test case can achieve 100% instruction coverage for "go(m, n)"? (m, n) = (A) 5, 10 (B) 5, 21 (C) 12, 15 (D) 9, 25

- (4) C 請問針對"go(m, n)", 哪一個測試案例沒有達到 100% branch coverage?

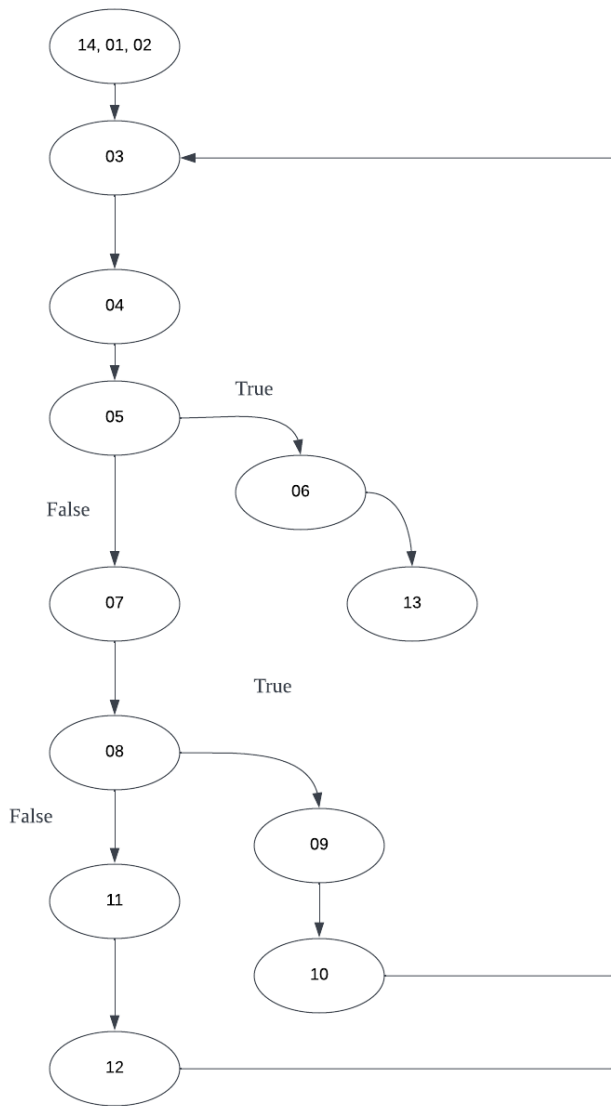
(Which test case can achieve 100% branch coverage for "go(m, n)"? (m, n) = (A) 4, 25 (B) 6, 17 (C) 7, 15 (D) 5, 20

- (5) 5-7-8-11-12

請寫出 go(4, 19)執行編號順序。(Please write the executing sequence number for go(4, 19).)

14-01-02-03-04-05-07-08-09-10-06-04-05-07-08-11-12-03-04-
(5) 05-04-05-06-13

- (3) 請畫出 go ()的流程圖(Draw the flow chart of the go().)



10.請針對計算機程式設計課程之教學，提出一個建設性的意見
(40 字含以上才給分)。(Please write down constructive advice for
this course, you will get the point when writing more than 40
words)