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 it 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  def myPrint(n):
08      for x in range(0, n):
09          printOneRow(0, x, 1, '^')
10          printOneRow(2*(___(1)___), -1, -2, '0')
11          printOneRow(2, ___(2)___, 2, '0')
12          print()
13  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),
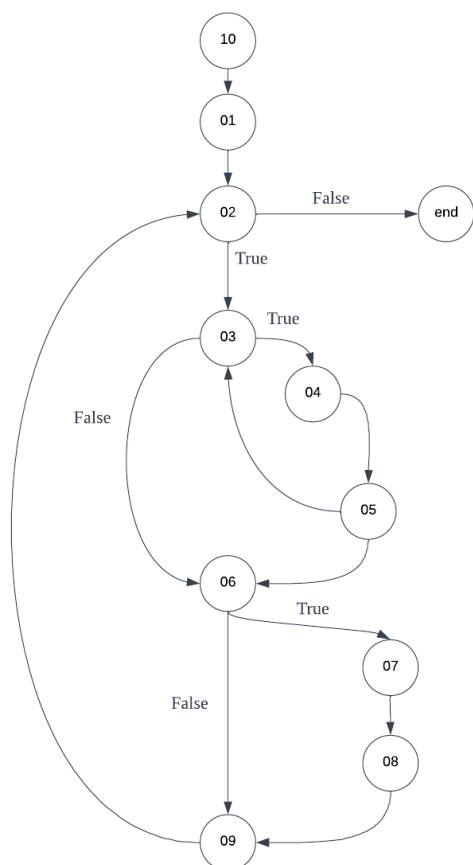
(2) 03-04-05-03-06-07-08-06-07-08
請寫出 PrintWithNestLoop(3)的執行編號順序(Please write the executing sequence number for PrintWithNestLoop(3).)
10-01-02-03-04-05-03-04-05-03-06-07-08-06-09-02-
____(2)____-06-07-08-06-09-02-03-06-07-08-06-07-08-06-
07-08-06-07-08-06-09-02

(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

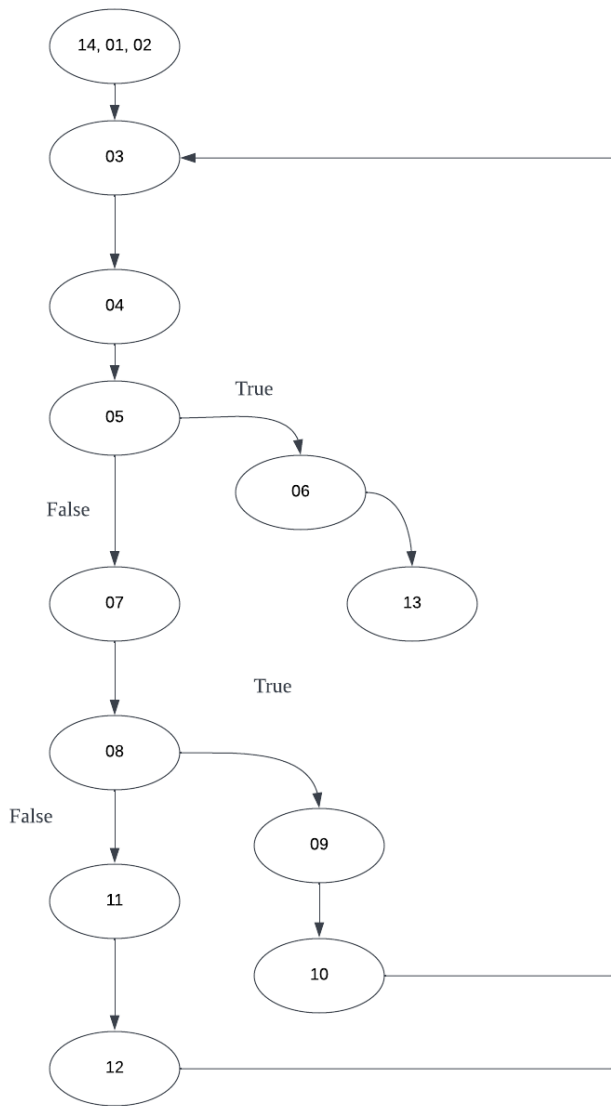(4) C 請問針對"go(m, n) "，哪一個測試案例沒有達到 100% branch coverage?
(Which test case can achieve 100% branch coverage for "go(m, n)"?) (m, n) = (A) 4, 25 (B) 6, 17 (C) 7, 15 (D) 5, 20

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

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

```
        ┌─────────────┐
        │  14, 01, 02 │
        └──────┬──────┘
               │
        ┌──────▼──────┐◄──────────────────┐
        │     03      │                    │
        └──────┬──────┘                    │
               │                           │
        ┌──────▼──────┐                    │
        │     04      │                    │
        └──────┬──────┘                    │
               │              True         │
        ┌──────▼──────┐─────────┐          │
        │     05      │         │          │
        └──────┬──────┘   ┌─────▼─────┐    │
          False │         │    06     │    │
               │          └─────┬─────┘    │
        ┌──────▼──────┐         │          │
        │     07      │   ┌─────▼─────┐    │
        └──────┬──────┘   │    13     │    │
               │          └───────────┘    │
               │  True                     │
        ┌──────▼──────┐─────────┐          │
        │     08      │         │          │
        └──────┬──────┘   ┌─────▼─────┐    │
          False │         │    09     │    │
               │          └─────┬─────┘    │
        ┌──────▼──────┐   ┌─────▼─────┐    │
        │     11      │   │    10     │────┤
        └──────┬──────┘   └───────────┘    │
               │                           │
        ┌──────▼──────┐                    │
        │     12      │────────────────────┘
        └─────────────┘
```

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)