THE UNIVERSITY OF AUCKLAND

Semester One, 2018
Campus: City

TEST

COMPUTER SCIENCE

Principles of Programming

(Time Allowed: 75 Minutes)

NOTE:
- You must answer **all** questions in this test
- Calculators are **NOT** permitted.
- Answer all questions in the space provided in this booklet
- There is space at the back for answers that overflow the allotted space.

Surname	
Forenames	
Preferred Name	
Student ID	
Username	
Lab Time	

Question	Mark	Out Of
1		**25**
2		**25**
3		**25**
4		**25**
Total		**100**

Question 1:

a) What is the output of the following code?

```
var1 = 5
var2 = 7
var1 = var1 * var2 // var1
var2 = var2 + var1 % var2
print("Var1:", var1, "\nVar2:",var2)
```

(2 marks)

b) What is the output of the following code?

```
result = 8 - 4 ** 3 / 5 // 2 % 15 * 2
print(result)
```

(3 marks)

c) What is the output of the following code?

```
import math
import random
var1 = int(math.pow(3, 3))
var2 = round(26.799, 1)
var3 = random.randrange(-3, 30, 3)
print(max(var1, var2, var3))
```

(3 marks)

d) If a cylinder has a radius r and a height h, then its volume is given by:

$$V = \pi r^2 h$$

Complete the following program that calculates the volume of a cylinder to 2 decimal places. The program will prompt the user to enter integer values for the radius and height. You can assume that the user always enters positive integer values. The program will produce the following output when the user enters 6 for the radius and 9 for the height:

```
Radius: 6
Height: 9
Volume: 1017.88
```

```
import math
```

(8 marks)

e) Complete the following program so that it calculates the number of yards, feet, and inches in 566 inches. There are 12 inches in a foot, and 3 feet in a yard. The program should produce the output shown below:

```
566 inches = 15 yards, 2 feet and 2 inches.
```

```
inches = 566
```

(9 marks)

Question 2:

a) What is the output of the following code?

```python
print("This", "is", sep="_", end=" ")
print("too", "easy", sep="*", end="")
print("!")
```

(2 marks)

b) What is the output of the following code?

```python
text = "Test"
hash_line = "#" * (len(text) + 2)
print(hash_line)
print("", text.upper(), "", sep="#")
print(hash_line)
```

(3 marks)

c) What is the output of the following code?

```python
text = "Python_programming_labs"
substring = text[text.find(" ") + text.rfind("B")] + \
            text[4] + text[6:10] + text[-2:]
print(substring)
```

(3 marks)

d) Complete the following program so that it deciphers 3 letter strings encrypted using a Caesar cipher with a shift of 6. The program will prompt the user to enter an encrypted string. You can assume that the user will always enter a 3 letter string consisting only of lowercase alphabetical characters. For example, the output of the program when the user enters the string "eky" is shown below:

```
Encrypted string: eky
Original string: yes
```

```
alphabet = "abcdefghijklmnopqrstuvwxyz"
shift = 6
```

(9 marks)

e) Complete the following program so that it asks the user to enter a string. You can assume that the user will always enter a string at least 1 character long consisting only of lowercase alphabetical characters. The program will capitalize one of the characters in the string at a random index. An example of the program running when the user has entered the string "videogames" is shown below.

```
Please enter a string: videogames
Modified string: viDeogames
```

```
import random
prompt = "Please enter a string: "
```

(8 marks)

Question 3 (25 marks)

a) What is the output of the following code?

```
def display_welcome(name):
    message = "Welcome ***" + name + "***"
    print(message)

def display_menu():
    print("1. Continue")
    print("2. Exit")

def main():
    name = "Sam"
    print(display_welcome(name))
    print(display_menu())

main()
```

(5 marks)

b) What is the output of the following code?

```
def info(title, authors, start_page, end_page, year):
    title = "Automata"
    authors = "D. L. Dill"
    start_page = 183
    end_page = 235
    year = 1994
    pages = end_page - start_page + 1
    year = year + 1
    print(authors, title, pages, year, sep=", ")
    return pages

def main():
    title = "Trees"
    authors = "S. V. Nagaraj"
    start_page = 1
    end_page = 44
    year = 1997
    pages=info(title, authors, start_page, end_page, year)
    print(authors, title, pages, year, sep=", ")

main()
```
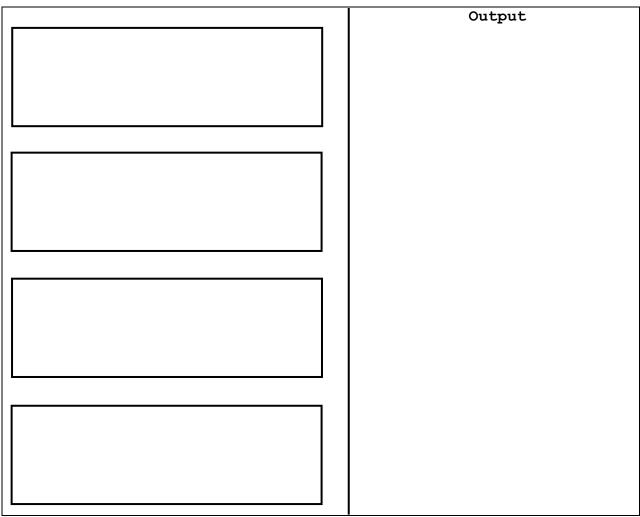
(6 marks)

c) Define the `sum_of_smallest_two()` function below which is passed three integer
    numbers. The function returns the sum of the two smallest numbers. For example,
    `sum_of_smallest_two(11, 5, 27)` is 16.

(6 marks)

ID: ………………

d) Draw the code trace of the following program and give out the output.

```
def main():
    a = 5
    b = first(a)
    print("4.",  b)
    b = second(b)
    print("5.",  b)

def first(a):
    b = 3
    print("1.",  a)
    return a * b

def second(a):
    print("2.", a - 5)
    a = third(a // 4)
    return a % 7

def third(a):
    print("3.", a)
    return a + 4

main()
```

Output

(8 marks)

Question 4 (25 marks)

a) What is the output of the following code?

```
def display_output(x, y, z):
    if x == 3 or y > 8:
        if x > 4 and z == 8:
            print("A")
        else:
            if not y == 6 and z >= x:
                print("B")
            else:
                print("C")
    else:
        if y == 6 and z >= x:
            print("D")
        else:
            print("E")

def main():
    display_output(3, 7, 11)

main()
```

```



```

(3 marks)

b) Complete the following `print_nums()` function using a `while` loop, so that the output is:
30 25 20 15 10 5 0 -5 -10.

```
def print_nums():
```

```




```

(3 marks)

c) Using the **line numbers provided**, give the line numbers of the four essential components of the `while` loop in the following function.

```
def total_user_numbers():                              # L1
  total = 0                                            # L2
  number = int(input("Enter a number (0 to end):"))    # L3
  while number != 0:                                   # L4
      total = total + number                           # L5
      number = int(input("Enter a number (0 to end):"))  # L6
  print("Total: ", total)                              # L7
```

```
Initialisation:


Condition:


Body:


Increment:


```

(4 marks)

d) Using the same variable names as those used in the code below, rewrite the following code using an equivalent `for ... in range()` loop instead of the `while` loop.

```
count = 0
num = 40512
while num  > 11231:
    print(count, num)
    count += 1
    num = num - 3471
```


(5 marks)

e) Give the output of the following code:

```
extra = 4
for num in range(5, 14, 3):
    if extra > 2:
        extra = extra - 1
    print(num + extra, end = " ")
```

(5 marks)

f) Write a `for ... in range()` which prints the word "scrumptious" 200 times continuously, i.e., with no newlines and no spaces between each print.

```
word = "scrumptious"
```

(5 marks)

– Overflow Sheet 1 –
Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet.

– Overflow Sheet 2 –
Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet.

– Overflow Sheet 3 –
Write the question number and letter next to your answer. You must ALSO
indicate in the allotted space that you have used the overflow sheet.