THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2014
Campus: City

COMPUTER SCIENCE

TEST SOLUTIONS

Principles of Programming

(Time Allowed: 75 minutes)

NOTE:
You must answer **all** questions in this test.
No calculators are permitted
Answer in the space provided in this booklet.
There is space at the back for answers which overflow the allotted space.

Surname	
Forenames	
Student ID	
Login (UPI)	
Lab Time	

Q1 (/20)	**Q4** (/12)	**Q7** (/10)
Q2 (/21)	**Q5** (/14)	**TOTAL** (/100)
Q3 (/9)	**Q6** (/14)	

Question 1 (20 marks)

a) Complete the output produced by the following code.

```
num1 = 4
num2 = 5
result = (num1 + num2 * 4 - num1 ** 2) / 2
print("Result:", result)
```

```
Result: 4.0
```

(2 marks)

b) Complete the output produced by the following code.

```
num1 = 3
num2 = 5
result = str(num1 + num2 * num1 // 2) + "00"
print("Result:", result)
```

```
Result: 1000
```

(2 marks)

c) Give the largest number and the smallest number which can be printed by the following code.

```
number = random.randrange(-5, 20, 5)
print(number)
```

```
Largest number: 15

Smallest number: -5
```

(2 marks)

d) Complete the output produced by the following code.

```
num1 = 7
num2 = 5
result = num1 % num2 + num2 % num1
print("Result:", result)
```

```
Result: 7
```

(2 marks)

e) Complete the output produced by the following code.

```
num1 = 15
num2 = 4
result = (num1 // num2) + num1 / (num2 - 2)
print("Result:", result)
```

```
Result: 10.5
```

(2 marks)

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f) Given the following function definition:

```
def print_result(num1, num2, message):
     portion = message[min(num1, num2) : max(num1, num2)]
     print("*" + portion + "*")
```

what is the output produced by the following function call?

```
print_result(8, 3, "Tricky Question")
```

```
*cky Q*
```

(2 marks)

g) Given the following function definition:

```
def get_number(prompt):
     user_input = input(prompt)
     user_input = user_input[0] + "0" * (len(user_input) - 1)
     return user_input
```

complete the output produced when the user enters 87692 at the prompt.

```
number = get_number("Enter a number: ")
print("Number:", number)
```

```
Enter a number: 87692
Number: 80000
```

(2 marks)

ID: ....

h) Complete the output produced by the following code.

```
phrase = "Sing out loud"
pos1 = phrase.find("ou")
pos2 = phrase.rfind("ou")
print("Result:", pos1, pos2)
```

```
Result: 5 10
```

(2 marks)

i) The following code prompts the user for their year of birth, gets the user's year of birth and prints the user's age this year. Complete the code.

```
prompt = "Enter year of birth: "
birth_year = input(prompt)
```

```
age = 2014 - int(birth_year)
```

```
print("Age this year:", age)
```

(2 marks)

j) Complete the following statement which assigns a list containing the following ten integer values: 10 , 20 , 30 , ..., 100 in that order, to the variable `int_list`.

```
int_list = [10, 20, 30, 40, 50, 60,
                 70, 80, 90, 100]
```

(2 marks)

CONTINUED

Question 2 (21 marks)

a) Complete the `adjust_word()` function which is passed two parameters: a word and a number (the required length of the string to be returned).

The function returns a string, the length of which is given by the parameter, `length`.

- If the parameter, `word`, has the same length as the required length, then the word is returned unchanged.
- If the parameter, `word`, is longer than the required length, the word is truncated to the required number of letters.
- If the word is shorter than the required length, the word is lengthened by adding the correct number of stars.

For example the following code:

```
word1 = adjust_word("cats", 4)
word2 = adjust_word("dogs", 7)
word3 = adjust_word("elephant", 5)
print(word1, word2, word3)
```

prints:

```
cats dogs*** eleph
```

```
def adjust_word(word, length):
    extras = "*" * length
    word = word + extras
    return word[0: length]
```

(7 marks)

b) Complete the `fiddle()` function which is passed two words as parameters. The function swaps the first character of the two words and returns the phrase made up of the two words separated by a blank space. For example, the following code:

```
print(fiddle("eat", "bats"))
print(fiddle("bun", "fight"))
```

prints:

```
bat eats
fun bight
```

```
def fiddle(word1, word2):
```

```
    letter1 = word1[0]
    letter2 = word2[0]

    word1 = letter2 + word1[1:]
    word2 = letter1 + word2[1:]

    return word1 + " " + word2
```

(7 marks)

c) Complete the `get_cost_message()` function which is passed three parameters: the number of items, the cost of each item and the percent discount. The function works out the total cost of the items minus the discount and **returns a string** made up of the string, "Number of items ", followed by the number of items, followed by ": $" and finally the cost. For example, the following code:

```
message1 = get_cost_message(2, 12, 10)
message2 = get_cost_message(20, 6, 20)
print(message1)
print(message2)
```

prints:

```
Number of items 2: $21.6
Number of items 20: $96.0
```

```
def get_cost_message(number_of_items, cost_each,
                                        discount_percent):
```

```
    cost = number_of_items *
                             cost_each
    discount = cost *
               discount_percent / 100

    to_pay = cost - discount
```

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```
message = "Number of items " +
             str(number_of_items) +
                 ": $" + str(to_pay)

return message
```

(7 marks)

ID: ....

Question 3 (9 marks)

a) Assume that `letter` is a variable which has been assigned a string value. Write **a boolean expression** whose value is `True` if and only if `letter` is a newline character.

```
letter == "\n"
```

(3 marks)

b) Assume that a variable `hours_worked` has been initialised. Complete the assignment statement which assigns the value `True` to the variable `worked_overtime` if `hours_worked` is greater than 40 and `False` otherwise.

```
worked_overtime = hours_worked > 40
```

(3 marks)

c) Given the already defined variables `temperature` and `humidity`, write **a boolean expression** which evaluates to `True` if the `temperature` is greater than 90 and the `humidity` is less than 10.

```
temperature > 90 and humidity < 10
```

(3 marks)

Question 4 (12 marks)

a) Write an `if` statement which multiplies the value associated with the variable, `pay`, by one-and-a-half if `worked_overtime` is `True`.

```
if worked_overtime:
    pay = pay * 1.5
```

(3 marks)

b) Write an `if/else` statement which assigns `True` to the variable `fever` if `temperature` is greater than 98.6, otherwise it assigns `False` to `fever`.

```
if temperature > 98.6:
    fever = True
else:
    fever = False
```

(3 marks)

c) Complete the `compare_ints()` function using an `if/elif` statement. The function compares the two integer values given by the parameters `first` and `second` and returns 0 if the two numbers are equal in value, 1 if the first number is greater than the second one, and -1 otherwise.

```
def compare_ints(first, second):
    if first == second:
        return 0
    elif first > second:
        return 1
    else:
        return -1
```

(6 marks)

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Question 5 (14 marks)

a) Use a while loop to complete the `sum_squares()` function, which computes the sum of the squares of the numbers from 1 up to (and including) the value given by the parameter, `number`. The function returns the sum. Note that you **MUST** use a **while** loop to solve the problem.

```
def sum_squares(number):
    count = 0
    sum = 0

    while count <= number:
        count += 1
        sum += count * count

    return sum
```

(7 marks)

b) Rewrite the `sum_squares()` function (question 5 part a) above, using a **for** loop structure.

```
def sum_squares(number):

    sum = 0

    for i in range(1, number+1):
        sum = sum + i * i

    return sum
```

(7 marks)

ID: ....

Question 6 (14 marks)

a) Complete the `get_duplicate_list()` function, which copies the content of the parameter list, `source`, into a new list. The function returns the new list which has the exact same content as the parameter list:

```
def get_duplicate_list(source):
```

```
    target = []

    for element in source:
        target = target + [element]


    return target
```

(7 marks)

b) Complete the `get_index_of_largest()` function which finds the largest value inside the parameter list of integers, `numbers.` The function returns the index of the largest number in the list. You can assume that all the number in the list are unique.

```
def get_index_of_largest(numbers):
```

```
    index = 0

    for i in range(1, len(numbers)):
        if numbers[index] <
                                numbers[i]:
            index = i

    return index
```

(7 marks)

ID: ....

Question 7 (10 marks)

a) Perform a code trace for the following program and give the output. Give the output in the space below and **show the code trace in the space provided on the next page**.

```
def main():
    number = 4975
    length = 4
    result1 = function1(number, 0)
    print("A")
    result2 = function1(number, length - 1)
    print("B")
    result = result1 + result2
    print("C", result)

def function1(num1, num2):
    num1 = str(num1)
    result = num1[num2]
    print("D", result)
    return result

main()
```

Give the output:

```
D 4
A
D 5
B
C 45
```

(6 marks)

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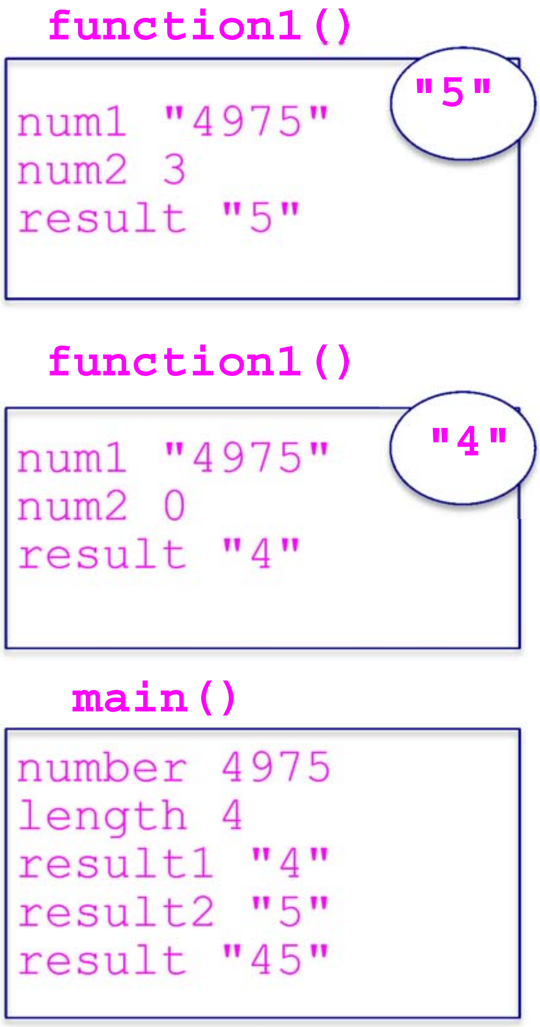
Show the code trace in the space below:



function1()

```
num1 "4975"
num2 3
result "5"
```

"5"

function1()

```
num1 "4975"
num2 0
result "4"
```

"4"

main()

```
number 4975
length 4
result1 "4"
result2 "5"
result "45"
```

(4 marks)