

**THE UNIVERSITY OF AUCKLAND**

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**FIRST SEMESTER, 2014**  
**Campus: City**

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**COMPUTER SCIENCE**

**Principles of Programming**

**(Time Allowed: One Hour)**

- NOTE:
- No calculators are permitted
  - Compare the test version number on the Teleform sheet supplied with the version number above. If they do not match, ask the test supervisor for a new sheet.
  - Enter your name and student ID on the Teleform sheet. Your name should be entered left aligned. If your name is longer than the number of boxes provided, truncate it.
  - Answer Section A (Multiple choice questions) on the Teleform answer sheet provided. Answer Section B in the space provided in this booklet.
  - Use a dark pencil to mark your answers in the multiple choice answer boxes on the Teleform sheet. Check that the question number on the sheet corresponds to the question number in this question book. If you spoil your sheet, ask the supervisor for a replacement.
  - There is space at the back for answers that overflow the allotted space.

<b>Surname</b>	
<b>Forenames</b>	
<b>Student ID</b>	
<b>Login (UPI)</b>	

	Question	Mark	Out Of
1 - 20	Multiple Choice		75
21	Tracing Code		9
22	Write a Function		10
23	Understanding Python code		6
<b>TOTAL</b>			<b>100</b>

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**SECTION A**  
**MULTIPLE CHOICE QUESTIONS**

For each question, choose the **best** answer according to the information presented in lectures. Select your preferred answer on the Teleform answer sheet by shading in the appropriate box.

**Question 1**

[3.75 marks] Given the following Python code, which one of the following statements best describes what happens to the values stored in the variables?

```
today = wednesday
```

- (a) The statement moves the value of variable `today` into variable `wednesday` leaving the value of variable `today` empty.
- (b) The statement moves the value of variable `wednesday` into variable `today` leaving the value of variable `wednesday` empty.
- (c) The statement tests if `today` and `wednesday` contain the same value or not.
- (d) The statement copies the value of variable `today` into variable `wednesday` leaving the value of variable `today` unchanged.
- (e) The statement copies the value of variable `wednesday` into variable `today` leaving the value of variable `wednesday` unchanged.

**Question 2**

[3.75 marks] What are the values of `girls`, `boys`, and `children` after the following code has been executed?

```
girls = 0  
boys = 0  
children = 0  
children = girls + boys  
girls = 15  
boys = 12
```

- (a) 15, 12, 0
- (b) 0, 0, 0
- (c) 15, 12, 27
- (d) 0, 0, 27
- (e) 0, 0, 1512

**Question 3**

[3.75 marks] Assume that the Python variables `dog`, `cat` and `rabbit` have all been assigned integer values. Which one of the following would best describe the outcome of the following piece of code?

```
rabbit = dog
cat = rabbit
dog = cat
```

- (a) Each variable would store the same value (the initial value of `rabbit`).
- (b) The values in variables `rabbit` and `dog` would be swapped.
- (c) Each variable would store the same value (the initial value of `dog`).
- (d) The values in variables `cat` and `dog` would be swapped.
- (e) The values in variables `rabbit` and `cat` would be swapped.

**Question 4**

[3.75 marks] Assume there are two Python string variables, `driver` and `navigator`. Which one of the following blocks of code will swap the values stored in those variables?

- (a) 

```
temp = navigator
driver = temp
navigator = driver
```
- (b) 

```
driver = navigator
navigator = temp
temp = driver
```
- (c) 

```
temp = navigator
driver = navigator
navigator = driver
```
- (d) 

```
temp = driver
driver = navigator
navigator = temp
```
- (e) 

```
driver = navigator
navigator = driver
```

**Question 5**

[3.75 marks] What does the following code print to standard output?

```
x = 0
x = x + 2
x = x + 4
x = x + 2
x = x + 0
print(x)
```

- (a) 0
- (b) 2
- (c) 4
- (d) 6
- (e) 8

**Question 6**

[3.75 marks] What does the expression  $8 + 8 / 2 * 4$  evaluate to?

- (a) 2.0
- (b) 32.0
- (c) 48.0
- (d) 24.0
- (e) 9.0

**Question 7**

[3.75 marks] What is the output of the following code?

```
blue = 0
red = 3
green = 2
purple = 6
brown = 1
print((brown + red) * blue + purple - green)
```

- (a) 4
- (b) 16
- (c) 22
- (d) 5
- (e) 8

**Question 8**

[3.75 marks] What does the expression  $2 \% 50$  evaluate to?

- (a) 25
- (b) 4
- (c) 2
- (d) 100
- (e) 50

**Question 9**

[3.75 marks] What does the expression  $7 // 2$  evaluate to?

- (a) 2
- (b) 3.5
- (c) 1
- (d) 7
- (e) 3

**Question 10**

[3.75 marks] During labs, you experimented with the use of the `round()` function. Given what you learned in labs, what is the output from the following code?

```
x = round(2.5)
y = round(3.5)
z = round(3.4)
print(x, y, z)
```

- (a) 2 4 3
- (b) 3 3 4
- (c) 2 3 3
- (d) 3 4 3
- (e) 3 4 4

**Question 11**

[3.75 marks] Consider the Python code fragment below (with deliberately uninformative variable and function names).

```
def mystery(riddle):
    puzzle = 7
    enigma = 5
    conundrum = puzzle + riddle
    return conundrum + enigma
```

Which one of the following function calls will evaluate to 20 when executed?

- (a) `mystery(7 + 5 + 8)`
- (b) `mystery(1)`
- (c) `mystery(6 + 2)`
- (d) `mystery(20)`
- (e) `mystery(2 + 0)`

**Question 12**

[3.75 marks] What is the output of the following code?

```
x = 23
result = 0
if x < 23:
    result = result + 1
elif x == 23:
    result = result + 2
elif x >= 23:
    result = result + 3
else:
    result = result + 4
print(result)
```

- (a) 3
- (b) 4
- (c) 9
- (d) 5
- (e) 2

**Question 13**

[3.75 marks] The following code should store the value 'voting age' in result when age is at least 18. Which expression should be used as the condition in the place of <expression> in the following code?

```
if <expression> :  
    result = 'can't vote yet'  
else:  
    result = 'voting age'
```

- (a) age = 18
- (b) age <= 18
- (c) age < 18
- (d) age >= 18
- (e) age > 18

**Question 14**

[3.75 marks] Consider the following block of Python code:

```
if num <= 0:  
    print('A')  
if num >= 10:  
    print('B')  
if num % 2 == 0:  
    print('C')
```

Which of the following values for num would each cause 'C' (and no other letter) to be printed?

- (a) When num is 2, 4, 6, or 8
- (b) When num is 2, 4, 6, 8 or 10
- (c) When num is 0, 2, 4, 6 or 8
- (d) When num is 0, 2, 4, 6, 8 or 10
- (e) When num is 0, 4, 6, 8, or 10

**Question 15**

[3.75 marks] Which value for age would result in the message 'Half price' being printed when the following Python code is executed?

```
if age <= 6:  
    message = 'Free entry'  
elif age < 10:  
    message = 'Half price'  
else:  
    message = 'Full price'  
print(message)
```

- (a) When age is 15
- (b) When age is 6
- (c) When age is 7
- (d) When age is 10
- (e) When age is 4

**Question 16**

[3.75 marks] The following code determines the number of pizzas eaten by 10 people. What is the output of the code?

```
people = 10
if people < 5:
    pizzas = people
elif people < 10:
    pizzas = 3 * people // 4
elif people < 15:
    pizzas = 2 * people // 3
else:
    pizzas = people // 2
print(pizzas)
```

- (a) 10
- (b) 9
- (c) 7
- (d) 5
- (e) 6

**Question 17**

[3.75 marks] What is the output of the following code?

```
my_list = [6, 2, 8, 2, 8]
new_list = []
for x in my_list:
    new_list = [x]
print(new_list)
```

- (a) [8]
- (b) [6, 2, 8]
- (c) []
- (d) [6, 2, 8, 2, 8]
- (e) [6]

**Question 18**

[3.75 marks] What is the output of the following code?

```
my_list = [6, 2, 8, 2, 8]
new_list = []
for x in my_list:
    new_list = [x] + new_list
print(new_list)
```

- (a) 26
- (b) [8]
- (c) [8, 2, 8, 2, 6]
- (d) [26]
- (e) [6, 2, 8, 2, 8]



**Question 19**

[3.75 marks] The function `max(a, b)` returns the largest of the values `a` and `b`. What is the output of the following code?

```
my_list = [4, 2, 5, 6]
m = 0
s = 0
for x in my_list:
    m = max(m, x)
    s = s + m
print(m, s)
```

- (a) 6 24
- (b) 6 19
- (c) 4 24
- (d) 0 0
- (e) 4 16

**Question 20**

[3.75 marks] The following function has an error and returns the wrong result. Most of the doctests will fail (i.e. the result returned from the function will not match the answer expected by the doctest). However, one of the tests will pass. Which one of the doctest function calls will produce the same answer as expected?

```
def calculate_average(numbers):
    """Returns the average

    Arguments: numbers - a list of numeric values
    Returns: the average of the list of numbers given

    >>> calculate_average([0.0, 0.0, 0.0])
    0.0
    >>> calculate_average([3])
    3
    >>> calculate_average([4.0, 4.0])
    4.0
    >>> calculate_average([2, 3])
    2.5
    >>> calculate_average([1, 2, 3, 4])
    2.5
    """
    n = len(numbers)
    total = 0
    for element in numbers:
        total = element
    return total / n
```

- (a) >>> calculate\_average([0.0, 0.0, 0.0])
- (b) >>> calculate\_average([3])
- (c) >>> calculate\_average([1, 2, 3, 4])
- (d) >>> calculate\_average([4.0, 4.0])
- (e) >>> calculate\_average([2, 3])

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**SECTION B**

Answer all questions in this section in the space provided. If you run out of space then please use the Overflow Sheet and indicate in the allotted space that you have used the Overflow Sheet.

**Question 21: Tracing Code**

In the box below, perform a code trace (similar to what you have done in labs) on the following function to show how the value of each variable changes.

```
def fun_with_variables():  
    x = 3  
    y = 4  
    temp = x  
    x = y  
    y = temp  
    a = 2  
    b = 5  
    a = b  
    b = a
```

(9 marks)

**Question 22: Write a Function**

Complete the `convert_currency()` function below. This function accepts a list of values and an exchange rate, and creates a new list containing the original values converted into another currency. To convert the values in the list into the new currency, multiply each value by the exchange rate. The values in the new list should be rounded to 2 decimal places. Before returning the new list, your function should first print out the list of new values followed by the list of old values (as shown in the example in the doctest below).

```
def convert_currency(values, exchange_rate):  
  
    """  
    Converts a list of values from one currency to another  
  
    Arguments: List of values (float)  
    Returns:   List of values in the new currency (float)  
    Prints:   The new list and the old list  
  
    >>> convert_currency([100, 65.75, 1045.0, 134], 1.5)  
    New List: [150.0, 98.62, 1567.5, 201.0]  
    Old List: [100, 65.75, 1045.0, 134]  
    [150.0, 98.62, 1567.5, 201.0]  
  
    """
```

```
import doctest  
doctest.testmod()
```

(10 marks)

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### Question 23: Understanding Python code

What is the output of the following Python program?

```
def will_pay(my_list,my_limit):  
    my_sum = 0  
    for amount in my_list:  
        my_sum = my_sum + amount  
    if my_sum <= my_limit:  
        print("OK")  
    else:  
        print("No Way")  
  
will_pay([2, 3, 4], 10)  
will_pay([3, 3, 5], 10)  
will_pay([2, 3, 5], 10)
```

(6 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.**

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