TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI

VICTORIA
UNIVERSITY OF WELLINGTON

EXAMINATIONS – 2018

TRIMESTER 2

COMP 132 Term Test

Programming for the Natural and Social Sciences

Time Allowed: 50 minutes

OPEN BOOK

Permitted materials: All materials, calculators and dictionaries are permitted

Instructions: Do not spend too much time on a question if you get stuck. For example, if you have to Google for a question, do it later after you work on other questions.

Write all your answers in a file called termtest.ipynb. Write your name and student ID at the top of your file as comments.

Save your file frequently to avoid data loss.

Submit your file using our online submission system immediately after the test.

The term test will be marked out of 50.

Questions

1. Using if	[7]
2. Writing loops	[3]
3. Using lists	[10]
4. Data analysis using Numpy arrays	[10]
5. Data visualization	[10]
6. Defining functions	[10]

Question 1. Using if [7 marks]

Write code to prompt the user to input a login name and a password for logging into a computer, and then check the input:

- If the input login name is `"root"` and the input password is `"123456"`, print `"Welcome!"`;
- If the input login name is `"root"` but the input password is not `"123456"`, print `"Password is wrong"`;
- If the input password is `"123456"` but the input login name is not `"root"`, print `"Login name is wrong"`;
- If the input login name is not `"root"` and the input password is not `"123456"`, print `"Both are wrong"`.

Question 2. Writing loops [3 marks]

Write a `for` loop to print the integer numbers from 25 to 48 (Note it should include 48).

Question 3. Using lists [10 marks]

Assign the following python `list` instance: `color_list = ["red", "green", "purple"]` Then write code to do the following actions:

(a) **[1 mark]** Print the third element in `color_list`.

(b) **[1 mark]** Add the word `"black"` to the end of `color_list`, and print `color_list`.

(c) **[1 mark]** Reverse the order of the words in `color_list`, and print `color_list`.

(d) **[2 marks]** Insert the word `"yellow"` at the position immediately after `"green"`, and print `color_list`.

(e) **[5 marks]** Write a loop to print each color in `color_list` on a separate line, and make sure that the first letter of each word in `color_list` is capitalized. (Note that you do not need to change the words in the list).

Question 4. Data Analysis using Numpy arrays [10 marks]

Start your program by importing the Numpy library:

```
import numpy as np
```

Suppose the following data is the number of cars sold by a car dealer in each month of 2017: `36,20,40,39,47,39,11,23,27,36,33,35`. Write code to complete the tasks below:

(a) **[1 mark]** Create a **Numpy array** containing the numbers.

(b) **[2 marks]** Calculate and print the number of cars sold during the first **nine** months by the car dealer in 2017.

(c) **[4 marks]** Write code to find the index in which the most cars were sold by the car dealer, and then print the name of the month. For example, your code should print `May` using the numbers giving in this question. Your code should still work when the numbers are different.

Hints: Create a list for the 12 months: `"Jan"`, `"Feb"`, `"Mar"`, `"Apr"`, `"May"`, `"Jun"`, `"Jul"`, `"Aug"`, `"Sep"`, `"Oct"`, `"Nov"`, `"Dec"` and use the list to print the right month.

(d) **[3 marks]** Write code to find whether the car dealer sold more cars in the first half of the year or the second half of the year. Print `First` or `Second` accordingly.

Question 5. Data visualization **[10 marks]**

Set up your program as follows:

```
%matplotlib inline
import matplotlib.pyplot as plt
```

Using the same data as in Question 4, write code (in one Jupyter cell) to visualize the data:

- (4 marks) Plot the data for the car dealer using a solid green line and circle markers;
- (2 marks) Add a title to the figure;
- (4 marks) Make the horizontal axis display Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec at the proper positions;
  Hint: You may use the month list you defined in Question 4.

Question 6. Defining functions **[10 marks]**

Define a function that takes one string parameter, and returns "valid" if the parameter string meets all the following conditions, and returns "not valid" otherwise.

- (3 marks) the length of the string should be at least 3, and at most 15 characters;
- (3 marks) the string should contain at least one space;
- (4 marks) the string should not contain any digits.

Test your function using different arguments. For example,

`check_string("OH")` should return "not valid" (too short)
`check_string("Liz with a long family name")` should return "not valid" (too long)
`check_string("MaryandJohn")` should return "not valid" (no space)
`check_string("Tom CO305")` should return "not valid" (with digits)
`check_string("Sam Smith")` should return "valid"

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