Programming I

Year 1 (2019/20), Semester 1

SCHOOL OF INFOCOMM TECHNOLOGY

Diploma in Information Technology
Diploma in Financial Informatics
Diploma in Cybersecurity & Digital Forensics
Common ICT Programme

REVISION QUESTIONS

Year - 2018

QUESTION 1 (20 marks)

Tom is training for his physical fitness test and records the timing taken for 3 rounds around a 400m track.

The formula for calculation is as follows:

Speed (in km/h) is given as $\frac{distance\ (km)}{time\ (h)}$

Tom has written a Python program to help him calculate his running performance. He has made 5 mistakes in the program. There may be more than one mistake per line. Help Tom debug and resolve the errors.

The Python program that Tom has created is shown below.

```
timing = float(input("Enter timing taken of 3 rounds separated by \';\'(seconds): "))

timing_list = timing.split(';')

speed_in_km_per_hr = 1.2 /((int(timing_list[0] + timing_list[1] + timing_list[2])) /
60*60)

print("Tom's average speed is {:.1f} km/h'.format(speed_in_km_per_hr))

first_round_min = int(timing_list[0]) // 60
first_round_sec = int(timing_list[0] % 60)
print('Tom took {} min and {} seconds for the first
round'.format(first_round_min,first_round_sec))
```

Create a new .py file with IDLE, and type the codes into the .py file. Copy and paste the corrected codes into the answer space below.

The following is a sample output of the corrected program (values underlined are the user's input):

```
Enter timing taken of 3 rounds separated by ';'(seconds): 110;100;90
Tom's average speed is 14.4 km/h
Tom took 1 min and 50 seconds for the first round
```

(20 marks)

QUESTION 2 (30 marks)

A local courier parcel delivery service charges its customers based on the weight of the parcel as follows:

Weight	**Cost**
Less than or equal to 1 kg	$10
Between 1 to 5 kg (not inclusive)	$15
Greater than or equal to 5 kg	$20

Furthermore if an express service is required, there is an additional charge of $10.50.

A program will be used to calculate the cost for delivering a parcel.

A sample run of the program is as follows:

```
Enter weight of parcel in kg : 1.5
Is express service required (y/n) : y
The cost is $25.50
```

The program should accept the response y in both upper and lower cases and display the cost to 2 decimal places.

(a) Write the pseudocode for the program.

(15 marks)

(b) Write the program in Python.

(15 marks)

QUESTION 3 (30 marks)

Mrs Tan made the following purchases at a bakery shop:

Item Description	Unit Price ($)	Quantity
Apple Pie	1.80	3
Chicken Pie	2.90	5
Apple Tart	0.85	9
Egg Tart	0.95	12
Durian Tart	1.10	30

(a) Using Python, create three lists to store the data given in the table, one list for each column (Item Description, Unit Price, and Quantity).

(6 marks)

(b) Write code to calculate the total cost of the purchases. The cost per item is calculated using the following formula:

Cost per Item = Unit Price x Quantity

You are expected to use a **loop** to perform the calculation.

Display the total cost with an appropriate label and to 2 decimal places.

(10 marks)

(c) Write code to select and display only the tarts that Mrs Tan has purchased. A sample of the output is as follows:

```
Item           Unit Price   Quantity
====           ==========   ==========

Apple Tart     $0.85        9
Egg Tart       $0.95        12
Durian Tart    $1.10        30
```

You are expected to use a **loop** in your code.

(14 marks)

QUESTION 4 (20 marks)

(a) Write a counting game program which prompts for an integer x between 1 and 100 inclusive. Display the numbers 1 to 100 in ascending order, replacing all numbers which are divisible by x with the word "skip". For example if the input is 7, numbers divisible by 7 such as 7, 14, 21 … 91, 98 will not appear but will be printed as "skip".

You are required to use **loop** and **selection** statements in the program.

The following is a sample run of the program.

```
Enter a number between 1 and 100: 7
    1
    2
    3
    4
    5
    6
 skip
    8
    9
   10
   11
   12
   13
 skip
   15
   .
   .
   .
   90
 skip
   92
   93
   94
   95
   96
   97
 skip
   99
  100
```

(12 marks)

(b) Modify the program in 4(a) to check that the input x is between 1 and 100 (inclusive). If x is out of range, prompt again for the value x until a valid number is entered.

The following is a sample run of the program.

```
Enter a number between 1 and 100: -2
Enter a number between 1 and 100: 102
Enter a number between 1 and 100: 0
Enter a number between 1 and 100: 7
    1
    2
    3
    4
    5
    6
 skip
    8
       .
       .
       .
```

(8 marks)

Year - 2017

QUESTION 1

ICT is building a time capsule to commemorate its 35th anniversary. This time capsule consists of 3 parts: a sphere, a column, and a cube. The radius of the column is half the radius of the sphere.

Tom oversees the gilding of the time capsule with gold paint. To do so, he must calculate the total surface area of the time capsule that requires the gilding.

Formulas for calculation are as follows:

- Surface area of the sphere is given as $4\pi r^2$
- Surface area of the column is given as $2\pi rh + 2\pi r^2$
- Surface area of the cube is given as $6w^2$

r = radius, h = height, w = width

Tom has written a Python program to help him calculate the surface area of this time capsule. He has made 8 mistakes in the program. Help Tom debug and resolve the errors. Write the corrected codes into the answer space below.

The Python program that Tom has created is shown below.

The following is a sample output of the corrected program (values underlined are the user's input):

```
Radius of the sphere: 5.5
Height of the column: 6.6
Width of the cube: 7.7
The total surface area of the Time Capsule is 897.43
```

Program to debug:

```
#Python program to calculate surface area of time capsule

radius_Sphere = float(input("Radius of the sphere: "))
height_Column = input("Height of the column: "))
width_Cube = str(input("Width of the cube: "))

surfacearea_Sphere = 4 * math.pi * math.pow(radius_Sphere)
surfacearea_Column = (2 * math.pi * (radius_Sphere) *
height_Column) \
                     + (2 * math.pi * ((r/2) ** 2))
surfacearea_Cube = 6 * (width_Block ** 2)

print("The total surface area of the Time Capsule is
{:2f}".format(total_SurfaceArea))
total_SurfaceArea = surfacearea_Sphere + surfacearea_Column +
surfacearea_Cube
```

QUESTION 2

Singa Air flies from Singapore to regional countries in Asia. Every passenger taking Singa Air flights are allowed 30kg of checked-in baggage. Any weight in excess of this will be charged at $12 per kg.

A Python program will be used to check if the passenger has to pay for his checked-in baggage. If required, the program will calculate and display how much the passenger has to pay for the excess baggage.

The following shows the sample inputs and outputs from 3 runs of the program (values underlined are the user's input).

```
Total weight of baggage (kg): 40.5
Your baggage is 10.50kg more than the limit of 30kg.
You will have to pay $126.00.
>>>
Total weight of baggage (kg): 25.9
You do not have to pay for your baggage.
>>>
Total weight of baggage (kg): 30
You do not have to pay for your baggage.
```

(a) Write the pseudocode for the program that calculates the amount to pay for excess baggage.

(b) Write the Python code for the program.

QUESTION 3

A Python program is used display all the students and their marks and to calculate the average marks for these students:

Name	John Tan	Tom Ong	Jane Lim	Jim Ng	Mary Choo	Steve Goh	Anne Lee
Marks	100	75	80	20	50	70	95

Create two lists for the data in the above table.

Write code to display all the students and their marks and to calculate the average marks for these students.

Write code to display the marks of the student whose surname is ‘Goh’.

QUESTION 4

Several programming languages make use of parenthesis () as delimiters in expressions as well as functions. For example, parenthesis () may be used in function calls such as print(), input() and to indicate precedence in expressions.

You are tasked to write a program that obtains a simple program as a string of characters and verifies if the program contains balanced parenthesis. You are required to use **loop** and **selection statements** in the program.

The following shows the sample inputs and outputs from 3 runs of the program (values underlined are the user's input).

```
Please enter your program in a string: print(a+b)
The program has balanced delimiters.
>>>
Please enter your program in a string: print)(a+b)+c(
The program does not have balanced delimiters.
>>>
Please enter your program in a string: print(((a+b)*c+(b*a))
The program does not have balanced delimiters.
```

** END OF PAPER ***