

## CSC1015F Assignment 6: Arrays

### Assignment Instructions

This assignment involves constructing Python programs that manipulate lists, dictionaries and strings.

### Question 1

This question concerns the development of an automated technical support system<sup>€</sup>. Users can enter technical queries and the system will suggest solutions.

As it stands, the tech support system consists of the program 'nohelp.py'. Running this program produces the following behaviour:

```
Welcome to the automated technical support system.
Please describe your problem:
My computer keeps crashing
Curious, tell me more.
I don't think it has a driving license
Curious, tell me more.
Really?
Curious, tell me more.
Oh forget it!
Curious, tell me more.
quit
```

The program just prints out the same response again and again.

#### 1.1 Some help [20 marks]

Using nohelp.py as the basis, create a new program called 'somehelp.py' that randomly selects a response from a list. The list should contain the following responses in the following order (so that your work can be automarked):

1. Have you tried it on a different operating system?
2. Did you reboot it?
3. What colour is it?
4. You should consider installing anti-virus software.
5. Contact Telkom.
6. I should get that looked at if I were you.

Here's an example of expected behaviour:

```
Welcome to the automated technical support system.
Please describe your problem:
My computer keeps crashing
What colour is it?
Blue, why?
You should consider installing anti-virus software.
Oh
You should consider installing anti-virus software.
You said that
```

<sup>€</sup>Assignment based on series of exercises from "Objects First with Java" by Barnes and Kölling.

```
Did you reboot it?
No
Contact Telkom.
quit
```

NOTE: To enable automarking, your program must:

1. Use a 'main()' function.
2. Use a list containing the given responses in the given order.
3. Use the following conditional to ensure it is not run when imported:  

```
if __name__ == '__main__':
    main()
```
4. Randomly select responses by using the Python `random.randint()` function. (you must import `random`.)

The function '`randint(a, b)`' returns a random integer N such that  $a \leq N \leq b$ .

## 1.2 Support [20 marks]

Using `somehelp.py` as the basis, create a new program called `support.py`.

Modify `support.py` so that it keeps a dictionary of responses indexed by keywords.

- Assume that the user only ever inputs a single word at a time.
- Given a word entered by the user, the program will look for that entry in the dictionary and will print the associated response.
- If there is no entry for that word the program will output 'Curious, tell me more.'

The dictionary should contain the following keyword-response pairs:

<b>keyword</b>	<b>response</b>
crashed	Are the drivers up to date?
blue	Ah, the blue screen of death. And then what happened?
hacked	You should consider installing anti-virus software.
Bluetooth	Have you tried mouthwash?
windows	Ah, I think I see your problem. What version?
apple	You do mean the computer kind?
spam	You should see if your mail client can filter messages.
connection	Contact Telkom.

Here's an example of expected behaviour:

```
Welcome to the automated technical support system.
Please describe your problem:
crashed
Are the drivers up to date?
yes
```

CONTINUED

```
Curious, tell me more.  
blue  
Ah, the blue screen of death. And then what happened?  
hacked  
You should consider installing anti-virus software.  
quit
```

**NOTE:** To enable automarking, your program must use a `'main()'` function and must contain the exact set of keyword and response pairs listed above.

### 1.3 Tech Support [30 marks]

Using `support.py` as the basis, create a new program called `techsupport.py`. Modify `techsupport.py` so that it splits a query up into a list of words and then, taking each in turn, searches the dictionary for a match.

- Once it finds a match it should print the associated response.
- It should NOT print more than one response.
- If none of the words can be matched then the program should output `'Curious, tell me more.'`

Here's an example of expected behaviour:

```
Welcome to the automated technical support system.  
Please describe your problem:  
My computer crashed  
Are the drivers up to date?  
No  
Curious, tell me more.  
I don't have an internet connection  
Contact Telkom.  
I did  
Curious, tell me more.  
They told me to use bluetooth  
Have you tried mouthwash?  
quit
```

**NOTE:**

- You may assume that user input is not punctuated.
- To enable automarking, your program must use a `'main()'` function and must contain the exact set of keyword and response pairs listed above.

**HINT:** A string can be split into a list of constituent words by using the `'split()'` method. For example:

```
>>> 'the rain in spain falls mainly on the plain'.split()  
['the', 'rain', 'in', 'spain', 'falls', 'mainly', 'on', 'the',  
 'plain']  
>>>
```

## Question 2 [30 marks]

Write a program called 'vectormath.py' to do basic vector calculations in 3 dimensions: addition, dot product and normalization.

A vector has 3 component values, such as (1, 3, 2) and is naturally storable as an array.

- Addition of vectors requires addition of the corresponding elements.
- A dot product is the sum of the products of corresponding elements.
- The norm of a single vector is the square root of the sum of the squares of the elements.

Suppose that we have 2 vectors:  $A=(1, 3, 2)$  and  $B=(2, 3, 0)$ :

- Addition:  
 $A+B = (1+2, 3+3, 2+0) = (3, 6, 2)$
- Dot product:  
 $A.B = 1.2 + 3.3 + 2.0 = 2 + 9 = 11$
- Norm (of A):  
 $|A| = \text{Sqrt}(1^2 + 3^2 + 2^2) = \text{Sqrt}(1+9+4) = \text{Sqrt}(14) = 3.74$
- Norm (of B):  
 $|B| = \text{Sqrt}(2^2 + 3^2 + 0^2) = \text{Sqrt}(4+9+0) = \text{Sqrt}(13) = 3.61$

For the norms, print your answer to 2 decimal positions.

*Sample I/O:*

```
Enter vector A:
1 3 2
Enter vector B:
2 3 0
A+B = [3, 6, 2]
A.B = 11
|A| = 3.74
|B| = 3.61
```

## Submission

Create and submit a Zip file called 'ABCXYZ123.zip' (where ABCXYZ123 is YOUR student number) containing somehelp.py, support.py, techsupport.py, and vectormath.py.

END