Name:

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Student Number:

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Please fill in your Student Number and Name.

Student Number : _____

University of Cape Town ~ Department of Computer Science

Computer Science 1018F ~ 2009

Test 2

Question	Max	Mark	Internal	External
1	3			
2	15			
3	12			
TOTAL	**30**			

Marks : 30

Time : 40 minutes

Instructions:

a) Answer all questions.

b) Write your answers, in pen, in the space provided.

c) Show all calculations where applicable.

Question 1 [3]

Given a list: `fruit = ['persimmon', 'granadilla', 'litchi']`

What would the *newfruit* list look like after each of the following operations. [3]

a)

```
newfruit = fruit[:-1]
```

_____

_____

b)

```
newfruit = [f*2 for f in fruit]
```

_____

_____

c)

```
newfruit = fruit
newfruit.append(['kiwi', 'plantain'])
```

_____

_____

Question 2 [15]

a) Your task is to create a telephone directory using a dictionary data structure that will allow a programmer to look up a telephone number given a person's name. This question has two parts:

i. Write a method *telparse(telfile)* that opens a file called telfile containing a list of names and associated telephone numbers. Each name and number is linked by a '=' (i.e., name1=telnum1) and telephone entries are seperated by spaces. A typical file might have the form:

James=6504058 Hussein=6505106

The *telparse* method should return a list of strings of the form `['name1=telnum1', 'name2=telnum2', …]`. Be sure to use proper exception handling when opening the *telfile* and close any open files once finished. [6]

ii. Write a method *teldir(tellist)* that takes the list of names and telephone number pairs from part (i) and creates and returns a dictionary indexed by name. Hint: you will need to use the '=' to split apart the name and telephone number. [5]

b) Mention two (2) practices of effective defensive programming and explain why they lead to fewer bugs or make debugging easier in the resulting programs. [4]

Question 3 [12]

Visual Python has a class which supports a variety of operations on vectors. You are given the following class declaration:

```
Class Vector():
    """A mathematical entity with three elements i, j, k.
    It represents direction and magnitude in a three-
    dimensional coordinate system."""
```

a) Create the following methods for your version of the Vector class:

i. An initialisation method that assigns its three parameters to the i, j, k instance variables. The parameters are optional and default to a value of 0.0.

ii. An add method that takes a vector as argument and performs component-wise addition with the current vector and returns the result as a new vector. Called as: v = v1.add(v2)

iii. A length method that returns the magnitude of the current vector (the square root of the sum of the squares of the vector elements). Called as: l = v.length() [10]

b) It might be easier for a user of the vector class to use the '+' addition operator (e.g., `v = v1 + v2`) instead of the add method (e.g., `v = v1.add(v2)`). How could this be done and what is this process called? [2]

_____

_____

_____