Please fill in your Student Number and Name.

Student Number : _____

Name:

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Student Number:

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University of Cape Town ~ Department of Computer Science

Computer Science 1018F ~ 2009

Test 1

Question	Max	Mark	Internal	External
1	10			
2	5			
3	15			
TOTAL	**30**			

Marks : 30

Time : 40 minutes

Instructions:

a) Answer all questions.

b) Write your answers in the space provided.

c) Show all calculations where applicable.

Question 1 [10]

a) What are the fundamental characteristics of the following native Python types: [6]

i. Dictionary

ii. List

iii. Tuple

iv. String

b) Mention three advantages of the Python programming language. [3]

c) Write a Python statement that will print out *Hello World!* [1]

Question 2 [5]

Consider the following program and answer the questions that follow.

```
def dosomething(l1):

      l2 = []
      for e in l1:
         l2.append(e+e)
      print l2
      return l2
```

a) What does this function do? [2]

b) What is the output if the input is [1,2,3] [1]

c) What is the output if the input is [‘a’, ‘b’, ‘c’] [1]

d) What characteristics of Python explain your answers to (b) and (c) [1]

Question 3 [15]

The following is the declaration for a class that implements a sparse array of integers:

```
Class SparseArray():
      """An array that only actively stores entries that
      are different from a set value."""
```

From the user's perspective SparseArray behaves like an array structure (with elements accessible by indexing) but it is to be implemented using a Dictionary data type that only stores entries different from a set value (*setval*).

Logically, this kind of array might look like: [-1 -1 -1 5 4 -1 -1 30 -1 54] where *setval* = -1 and only 5, 4, 30 and 54 are explicitly stored.

a) What is the term for hiding the implementation details of a class like this? [1]

b) Write an initialisation function that creates an empty dictionary that is not accessible from outside the class. The initialiser should take in an optional *setval* parameter for elements that are not stored explicitly (and *setval* should default to zero). [3]

c) Write methods to get and set particular entries in the sparse array. The users should be able to call these functions using standard array indexing (e.g., *sparse[5] = 10*, *x = sparse[0]*) but the values must be placed in and acquired from the private internal dictionary or the *setval* attribute. [6]

d) Write a method for the SparseArray class, called *mult(x)*, that multiplies ***every*** element in the array by x. [5]