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 1015F ~ 2011

Supplementary Class Test 3

Question	Max	Mark	Marker
1	10		
2	10		
3	10		
TOTAL	**30**		

Marks : 30

Time : 40 minutes

Instructions:

a) Answer all questions.

b) Write your answers in pen in the spaces provided.

c) Show all calculations where applicable.

Question 1 [10]

Answer the following questions based on the code below.

```
def stuff ( filename ):
   infile = open (filename, "r")
   lines = infile.readlines ()
   infile.close ()
   outfile = open (filename, "w")
   for line in range (0, len(lines)):
      print (lines[line][-10:], file=outfile, end="")
   outfile.close ()
```

(a) Explain clearly what this code as a whole accomplishes. [2]

(b) Explain the meanings of the "a" and "w" file access modes. [2]

(c) Why does the print statement include **file=outfile**? What would the effect of leaving this out be? [2]

(d) Write a statement to invoke this function on the **shorty.txt** file. Assume that **stuff** is located in the **dostuff.py** module and you are attempting to invoke it from within the **quickanddirty.py** program that is located in the same directory. Assume that the module has been imported with "import dostuff". [2]

(e) An exception handler is made up of a set of code blocks (**try/except/finally**). Explain what the purpose of any 2 blocks of an exception handler are. [2]

Question 2 [10]

(a) What are the 2 key elements of a **recursive** function? [2]

(b) Complete the following recursive function to calculate the sum of numbers from 1 to n. [4]

```
def sum ( n ):
```

(c) In general, when you have both an iterative algorithm and a recursive algorithm to solve a problem, which algorithm would you choose? Why? [2]

(d) Write an iterative solution to the problem in (b). [2]

Question 3 [10]

(a) Sort the following numbers using the recursive **quicksort** algorithm. Always choose the last element as the pivot. Clearly show each of the 3 steps of the algorithm with the pivot values circled in each step. [6]

```
8 17 13 14 5 10 12 11
```

(b) What is the average time complexity of the quicksort algorithm? [1]

(c) Describe the algorithm you would use to efficiently check for the existence of multiple items in a very long list of names. [3]