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

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[len(lines)-1-line], file=outfile, end="")
   outfile.close ()
```

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

(b) Explain the meanings of the “r” and “w” file access modes. [2]

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

(d) Write a statement to invoke this function on the upsidedown.txt file. Assume that stuff is located in the filestuff.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 filestuff”. [2]

(e) Programs that access files often use **try … except** exception handling code. What is the purpose of exception handling? [2]

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Question 2 [10]

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

(b) Complete the following recursive function to calculate the factorial of a number. Remember that the factorial is the product of all numbers from 1 up to a given number. [4]

```
def factorial ( 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]

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Question 3 [10]

(a) Sort the following numbers using the recursive **mergesort** algorithm. Clearly show each step (3 partitioning steps and 3 merging steps) of the algorithm. [6]

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

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

(c) Describe the algorithm you would use to print out a list of unique names from a list. [3]