

Duration: **50 minutes**
 Aids Allowed: **None**

Student Number: _____

Last Name: SOLUTION

First Name: _____

TA: _____ Instructor: Reid

*Do **not** turn this page until you have received the signal to start.*
 (In the meantime, please fill out the identification section above,
 and read the instructions below *carefully*.)

MARKING GUIDE

This midterm test consists of 6 questions on 6 pages (including this one), plus the aid sheet. *When you receive the signal to start, please make sure that your copy of the test is complete.* Extra space was left for each of the programming questions. Please indicate clearly the part of your work that should be marked.

IMPORTANT: You do not need to include the “#!” line in Bourne shell or Python programs you are asked to write. In C programs, you do not need to add “#include” lines, or do error checking unless the question requires it, or the program would not function correctly given valid input without error checking.

1: _____/ 5

2: _____/ 4

3: _____/ 3

4: _____/ 7

5: _____/ 5

6: _____/ 6

TOTAL: _____/30

Good Luck!

Question 1. [5 MARKS]

Circle the correct answer.

TRUE FALSE When a pipe is used in shell such as `ls | wc`, the second process does not start until the first has completed.TRUE FALSE The following are all examples of expressions that evaluate to absolute paths: `/bin`, `$HOME/bin`, `~/a/b`.TRUE FALSE

I need to compile my shell program before I can run it.

TRUE FALSE

A string in Python can be modified in place. I.e., the following is legal Python:

```
str = "Hello"
str[0] = 'J'
```

TRUE FALSE In Bourne shell, `ls *` and `ls "*"` produce the same result**Question 2.** [4 MARKS]You are given the following shell program which is stored in an executable file called `noisytest`:

```
#!/bin/sh
if test -f $1
then
    echo "Found $1"
    exit 0
else
    echo "ERROR: file $1 not found"
    exit 1
fi
```

Write a Bourne shell program that runs `noisytest`, but only prints the output to the screen if `noisytest` exits with a value of 1. If `noisytest` returns 0, nothing should be printed

```
result='noisytest $1'
if [ $? -ne 0 ]
then
    echo $result
fi
```

Question 3. [3 MARKS]

Consider the following program:

```
int main()
{
    int i, j;
    i = fork();
    if(i == 0) {
        printf("Child\n");
        exit(0);
    } else {
        printf("Parent\n");
    }

    j = fork();
    printf("Last line\n");
}
```

Part (a) [1 MARK]

The number of processes that are created including the first process to execute main is 3

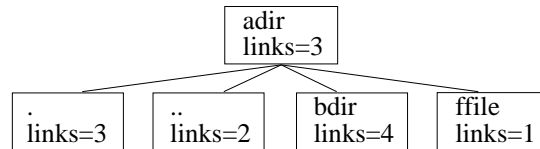
Part (b) [2 MARKS]

Write the output of the above program in a valid order.

Parent		Child
Child	or	Parent
Last line		Last line
Last line		Last line

Question 4. [7 MARKS]

Write a C program that prints the number of directories contained in the immediate subdirectories of the current working directory. The number of directories contained in a directory is the number of hard links given by the stat struct for that directory. In the example below, adir has 3 hard links corresponding to its 3 subdirectories. If the current working directory was adir, then your C program will print out 9.



```

int main()
{
    DIR *dir = opendir(".");
    struct dirent *entry;
    struct stat sbuf;
    int sum = 0;

    while(entry = readdir(dir)) {
        if(stat(entry->d_name, &sbuf) == 0) {
            if(S_ISDIR(sbuf.st_mode)) {
                sum += sbuf.st_nlink;
            }
        }
    }
    printf("The number of subdirectories of . is %d\n", sum);
}

```

Question 5. [5 MARKS]

Write a Bourne shell program that prints out the names of all the executable files in the current working directory. The program should not print out the names of directories that have execute permissions. Do not use `ls`.

```
#!/bin/sh

for f in *
do
    if [ -f $f -a -x $f ]
    then
        echo $f
    fi
done
```

Question 6. [6 MARKS]

Complete the following Python program. The program reads one line from standard input. The program prints out all the numbers in `line` except the largest and the smallest. The order of the printed numbers does not matter, and there is no limit to the number of numbers that appear on one line. One mark will be deducted from a correct solution that has more than one loop. A bonus mark will be awarded for a correct solution with no loops.

For example, if the input is “5.6 5.4 5.7 5.7 5.6” the output is “5.6 5.7 5.6” (in any order).

```
#!/usr/local/bin/python
import sys

line = sys.stdin.readline()
list = line.split()
list.sort()
print " ".join(list[1:-1])
```