CS2211a Lab No. 4
Introduction to UNIX
Tuesday October 7, 2014 (sections 3 and 2),
Wednesday October 8, 2014 (sections 6 & 7), and
Thursday October 9, 2014 (sections 4 and 5)

Location: ***MC10*** lab

The objective of this lab is:

- to practice Unix Shell Programming

If you would like to leave, and at least 30 minutes have passed, raise your hand and wait for the TA.
Show the TA what you did. If, and only if, you did a reasonable effort during the lab, he/she will give you the lab mark.

==========

1. Consider the following shell script **Q1**

```
#!/bin/sh
x=$2
echo  $1      $x $*
echo `$1      $x $*`
echo "$1      $x $*"
echo '$1      $x $*'
echo $#
shift
echo  $1      $x $*
echo `$1      $x $*`
echo "$1      $x $*"
echo '$1      $x $*'
echo $#
```

Understand and trace the script using `-x` and `-xv` options when calling it with the following arguments (try to expect the output before you execute the command):

   a. `Q1 pwd echo`
   b. `Q1 echo pwd`

2. Consider the shell script **Q2**:

```
#!/bin/sh
X=$1
echo $X
shift
while [ $# -gt 0 ]; do
  echo $1
  if [ $1 -gt $X ]; then
    X=$1
    echo "   << $X"
  fi
  shift
done
echo "-----";  echo $X
```

Understand and trace the script using `-x` and `-xv` options when calling it with the following arguments (try to expect the output before you execute the command):

```
Q2 11 4 19 7 31 49 1 6
```

3. Change your current shell to Bourne shell (by executing `sh` command). Delete any file or directory called `~/abc`, what is the *printable output* of the following Unix commands:
```
cd; mkdir abc;   ABC=abc;   echo "ls -a $ABC";   echo `ls -a \$ABC | wc -w`
```

4. Explain what happens when you execute the following shell script
```
#!/bin/sh
#
echo
hour=`date +%H`
if [ "$hour" -lt 12 ]
then
  echo "GOOD MORNING"
elif [ "$hour" -lt 18 ]
  then
    echo "GOOD AFTERNOON"
  else
    echo "GOOD EVENING"
fi
echo
```

   If you decided not to use "`elif`", what you should change in the program to keep it works the same way.

5. Consider you executed the following command:
```
(echo a b c; echo 1 2 3) > data_file
```
   Also consider that you have a shell script called `script.sh` as listed below:
```
#!/bin/sh
while read a b
do
  echo $a $a $b $b $c $c
  echo $a $a $b $b $c $c
done | tr a-z A-Z
```
   Trace and explain the output of the following command:
```
script.sh < data_file
```

6. Explain what happens when you execute the following commands:
```
pwd
rm -r new_dir
mkdir new_dir
cd new_dir

cat <<+ > new_file
#!/bin/sh

echo "I am inside new_file"
echo "Current directory is `pwd`"
+
chmod u+x new_file
/bin/ls -l
`/bin/ls`
cd ..
rm -r new_dir
pwd
```

7. Write a Bourne shell script that takes a seconds as a positive integer parameter (less than 86400) representing the number of seconds since midnight and returns the equivalent time in hours (0-23), minutes (0-59), and seconds (0-59), respectively.