DEPARTMENT OF SOFTWARE ENGINEERING

LAB#6

SUBMITTED TO:

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Task 1 – Switch to root with su - and back to a normal user

```
khadija@ubuntu:~$ sudo passwd root
New password:
Retype new password:
passwd: password updated successfully
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ su -
Password:
root@ubuntu:~# whoami
root
root@ubuntu:~# id
uid=0(root) gid=0(root) groups=0(root)
root@ubuntu:~#
```

```
root@ubuntu:~# exit
logout
khadija@ubuntu:~$ whoami
khadija
khadija@ubuntu:~$
```

Task 2 – Create user tom and verify in passwd/group/shadow

```
khadija@ubuntu:~$ sudo adduser tom
info: Adding user `tom' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `tom' (1001) ...
info: Adding new user `tom' (1001) with group `tom (1001)' ...
info: Creating home directory `/home/tom' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for tom
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
info: Adding new user `tom' to supplemental / extra groups `users' ...
info: Adding user `tom' to group `users' ...
khadija@ubuntu:~$
```

```
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:121::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1001:,,,:/home/tom:/bin/bash
khadija@ubuntu:~$ cat /etc/passwd
```

```
tom:x:1001:
khadija@ubuntu:~$ cat /etc/group
```

```
xrdp:!:20395::::::
tom:$y$j9T$UiRQ/gzsUkW9gYNNtiIzD/$.CDS8HPajTmbpCsNvLLVjMEL8xINTr5Obdqjv1tnVV8:20398:0:99999:7:::
khadija@ubuntu:~$ sudo cat /etc/shadow
```

Task 3: Create groups; change tom's primary and secondary groups

```
tom:x:1001:
developer:x:1002:
devops:x:1003:
designer:x:1004:
khadija@ubuntu:~$ cat /etc/group
```

```
khadija@ubuntu:~$ sudo usermod -g designer tom
khadija@ubuntu:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users)
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo usermod -aG developer,devops tom
khadija@ubuntu:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users),1002(developer),1003(devops)
khadija@ubuntu:~$ groups tom
tom : designer users developer devops
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo usermod -G tom tom
khadija@ubuntu:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),1001(tom)
khadija@ubuntu:~$ groups tom
tom : designer tom
khadija@ubuntu:~$
```

Task 4: Create/delete users (Jerry, Scooby) and groups (jolly, anime)

```
khadija@ubuntu:~$ sudo adduser jerry
info: Adding user `jerry' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `jerry' (1005) ...
info: Adding new user `jerry' (1005) with group `jerry (1005)' ...
info: Creating home directory `/home/jerry' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for jerry
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
info: Adding new user `jerry' to supplemental / extra groups `users' ...
info: Adding user `jerry' to group `users' ...
khadija@ubuntu:~$ sudo useradd scooby
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ su scooby
Password:
su: Authentication failure
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo passwd scooby
[sudo] password for khadija:
New password:
Retype new password:
passwd: password updated successfully
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ su - scooby
Password:
su: warning: cannot change directory to /home/scooby: No such file or directory
$
```

```
scooby:x:1006:1006::/home/scooby:/bin/sh
khadija@ubuntu:~$ ls -ld /home/scooby
ls: cannot access '/home/scooby': No such file or directory
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo mkdir -p /home/scooby
khadija@ubuntu:~$ sudo chown scooby:scooby /home/scooby
khadija@ubuntu:~$ sudo chmod 750 /home/scooby
khadija@ubuntu:~$ ls -ld /home/scooby
drwxr-x--- 2 scooby scooby 4096 Nov  7 09:22 /home/scooby
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ su - scooby
Password:
$ pwd
/home/scooby
$ ls -la
total 8
drwxr-x--- 2 scooby scooby 4096 Nov  7 09:22 .
drwxr-xr-x 7 root   root   4096 Nov  7 09:22 ..
$
```

```
tom:x:1001:1004:,,,:/home/tom:/bin/bash
jerry:x:1005:1005:,,,:/home/jerry:/bin/bash
scooby:x:1006:1006::/home/scooby:/bin/sh
khadija@ubuntu:~$ cat /etc/passwd
```

```
khadija@ubuntu:~$ sudo usermod -s /bin/bash scooby
khadija@ubuntu:~$ su - scooby
Password:
scooby@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo addgroup jolly
info: Selecting GID from range 1000 to 59999 ...
info: Adding group `jolly' (GID 1007) ...
khadija@ubuntu:~$ sudo groupadd anime
khadija@ubuntu:~$
```

```
jerry:x:1005:
scooby:x:1006:
jolly:x:1007:
anime:x:1008:
khadija@ubuntu:~$ cat /etc/group
```

```
khadija@ubuntu:~$ sudo delgroup jolly
info: Removing group `jolly' ...
khadija@ubuntu:~$ sudo groupdel anime
```

```
jerry:x:1005:
scooby:x:1006:
khadija@ubuntu:~$ sudo delgroup jolly and sudo groupdel anime
```

```
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:121::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:,,,:/home/tom:/bin/bash
khadija@ubuntu:~$ sudo deluser --remove-home Jerry and sudo userdel -r Scooby
```

Task 5: Create user Student; create files; set owner/group; identify file types

```
khadija@ubuntu:~$ sudo adduser student
info: Adding user `student' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `student' (1005) ...
info: Adding new user `student' (1005) with group `student (1005)' ...
info: Creating home directory `/home/student' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for student
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
info: Adding new user `student' to supplemental / extra groups `users' ...
info: Adding user `student' to group `users' ...
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ su - student
Password:
student@ubuntu:~$ touch file1
student@ubuntu:~$ mkdir -p dir1
student@ubuntu:~$ touch dir1/file2
student@ubuntu:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  7 09:46 dir1
-rw-rw-r-- 1 student student    0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo chown tom /home/student/file1
khadija@ubuntu:~$ sudo ls -l /home/student/file1
-rw-rw-r-- 1 tom student 0 Nov  7 09:46 /home/student/file1
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo chgrp devops /home/student/file1
khadija@ubuntu:~$ sudo ls -l /home/student/file1
-rw-rw-r-- 1 tom devops 0 Nov  7 09:46 /home/student/file1
khadija@ubuntu:~$
```

```
student@ubuntu:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  7 09:46 dir1
-rw-rw-r-- 1 tom     devops     0 Nov  7 09:46 file1
student@ubuntu:~$ ls -l dir1
total 0
-rw-rw-r-- 1 student student 0 Nov  7 09:46 file2
student@ubuntu:~$ ls -l /dev/null
crw-rw-rw- 1 root root 1, 3 Nov  4 08:01 /dev/null
student@ubuntu:~$ file file1 dir1 /dev/null
file1:     empty
dir1:      directory
/dev/null: character special (1/3)
student@ubuntu:~$
```

```
student@ubuntu:~$ exit
logout
khadija@ubuntu:~$
```

Task 6: Change permissions using symbolic mode

```
khadija@ubuntu:~$ su - student
Password:
student@ubuntu:~$ cd ~
student@ubuntu:~$ ls -l file1
-rw-rw-r-- 1 tom devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo chown student /home/student/file1
khadija@ubuntu:~$ su -student
Password:
```

```
student@ubuntu:~$ chmod -rwx file1
student@ubuntu:~$ ls -l file1
---------- 1 student devops 0 Nov  7 09:46 file1
```

```
student@ubuntu:~$ ls -l file1
-r--r--r-- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod u+x file1
student@ubuntu:~$ ls -l file1
-r-xr--r-- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod ug+w file1
student@ubuntu:~$ ls -l file1
-rwxrw-r-- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod ugo-rwx file1
student@ubuntu:~$ ls -l file1
---------- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

Task 7 - Change permissions using “set” symbolic form (u= g= o=)

```
khadija@ubuntu:~$ su - student
Password:
student@ubuntu:~$ cd ~
student@ubuntu:~$ ls -l file1
---------- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod 750 file1
student@ubuntu:~$ ls -l file1
-rwxr-x--- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod g=rw,o=rw file1
student@ubuntu:~$ ls -l file1
-rwxrw-rw- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod u=,g=,o= file1
student@ubuntu:~$ ls -l file1
---------- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

Task 8 - Change permissions using numeric (octal) mode

```
khadija@ubuntu:~$ su - student
Password:
student@ubuntu:~$ cd ~
student@ubuntu:~$ ls -l file1
---------- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod 777 file1
student@ubuntu:~$ ls -l file1
-rwxrwxrwx 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod 700 file1
student@ubuntu:~$ ls -l file1
-rwx------ 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

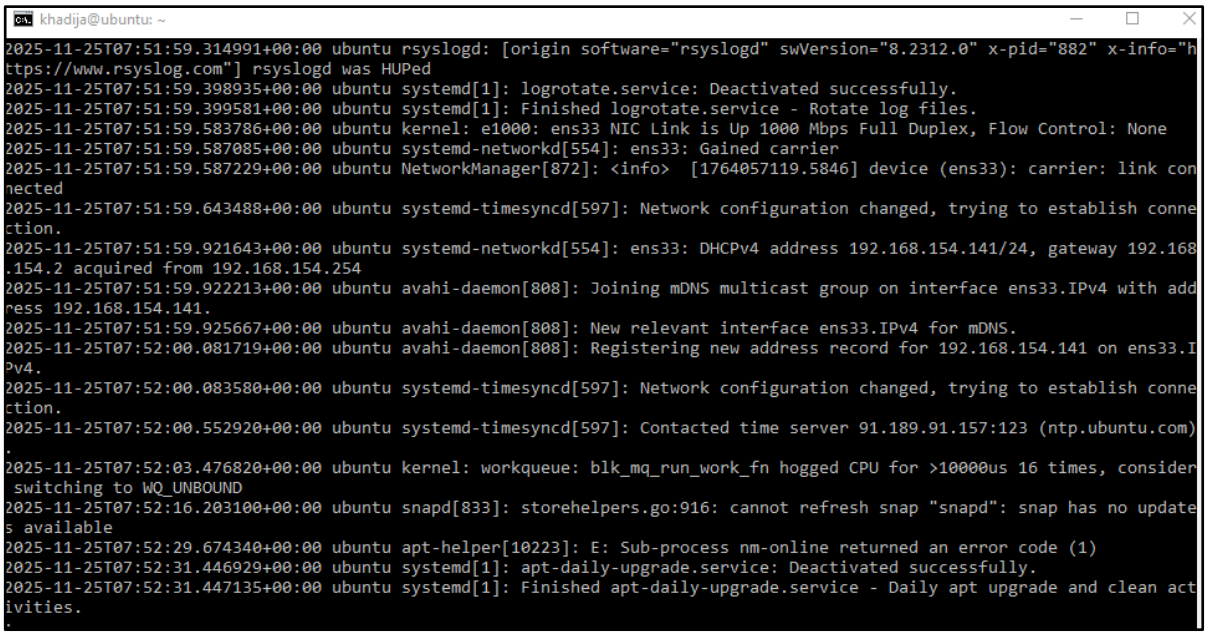
```
student@ubuntu:~$ chmod 744 file1
student@ubuntu:~$ ls -l file1
-rwxr--r-- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod 640 file1
student@ubuntu:~$ ls -l file1
-rw-r----- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

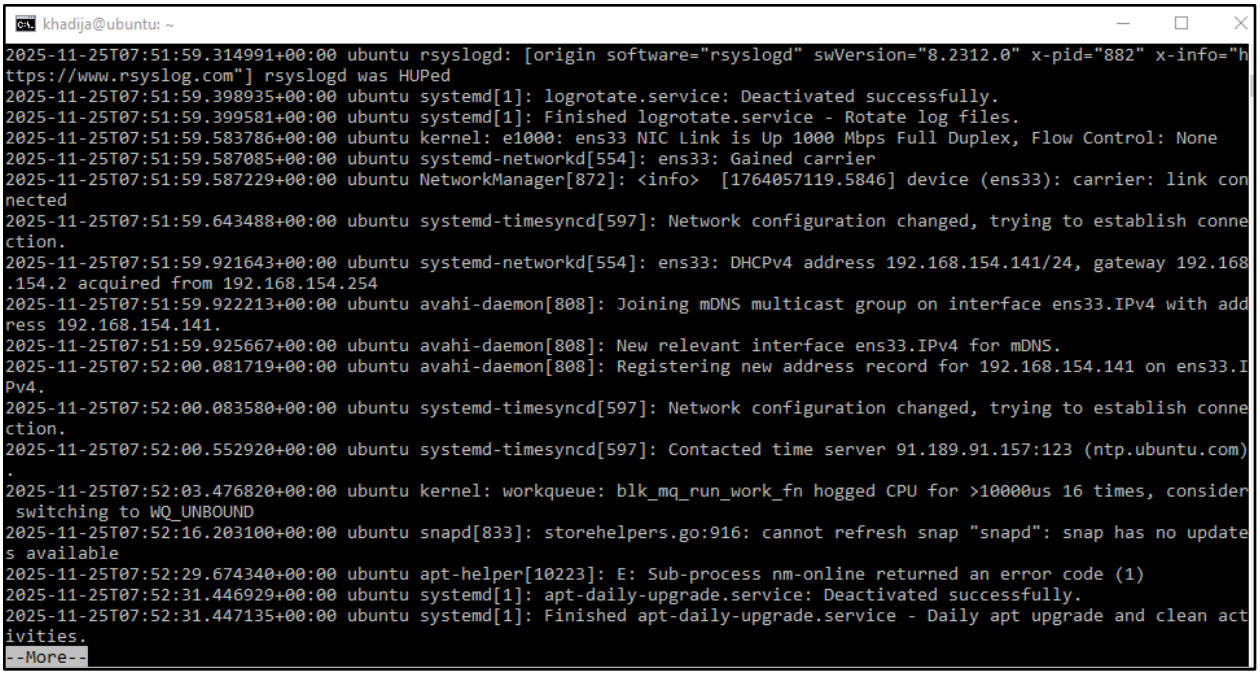
```
student@ubuntu:~$ chmod 775 file1
student@ubuntu:~$ ls -l file1
-rwxrwxr-x 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

```
student@ubuntu:~$ chmod 750 file1
student@ubuntu:~$ ls -l file1
-rwxr-x--- 1 student devops 0 Nov  7 09:46 file1
student@ubuntu:~$
```

Task 9 - Practice pipes, pagers, grep, and redirects with /var/log/syslog




```
khadija@ubuntu:~$ sudo cat /var/log/syslog | less
khadija@ubuntu:~$ khadija@ubuntu:~$ sudo cat /var/log/syslog | mor
```




```
khadija@ubuntu:~$ sudo grep -E 'fail|error' /var/log/syslog | head
2025-11-25T07:52:29.674340+00:00 ubuntu apt-helper[10223]: E: Sub-process nm-online returned an error code (1)
khadija@ubuntu:~$
```

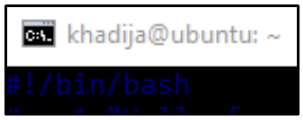
```
khadija@ubuntu:~$ sudo grep -i systemd /var/log/syslog > ~/syslog_systemd.txt
khadija@ubuntu:~$
```

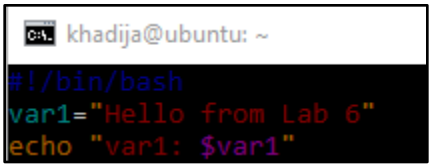
```
khadija@ubuntu:~$ sudo grep -i network /var/log/syslog >> ~/syslog_systemd.txt
khadija@ubuntu:~$ cat ~/syslog_systemd.txt
2025-11-25T07:51:59.398935+00:00 ubuntu systemd[1]: logrotate.service: Deactivated successfully.
2025-11-25T07:51:59.399581+00:00 ubuntu systemd[1]: Finished logrotate.service - Rotate log files.
2025-11-25T07:51:59.587085+00:00 ubuntu systemd-networkd[554]: ens33: Gained carrier
2025-11-25T07:51:59.643488+00:00 ubuntu systemd-timesyncd[597]: Network configuration changed, trying to establish connection.
2025-11-25T07:51:59.921643+00:00 ubuntu systemd-networkd[554]: ens33: DHCPv4 address 192.168.154.141/24, gateway 192.168.154.2 acquired from 192.168.154.254
2025-11-25T07:52:00.083580+00:00 ubuntu systemd-timesyncd[597]: Network configuration changed, trying to establish connection.
2025-11-25T07:52:00.552920+00:00 ubuntu systemd-timesyncd[597]: Contacted time server 91.189.91.157:123 (ntp.ubuntu.com).
2025-11-25T07:52:31.446929+00:00 ubuntu systemd[1]: apt-daily-upgrade.service: Deactivated successfully.
2025-11-25T07:52:31.447135+00:00 ubuntu systemd[1]: Finished apt-daily-upgrade.service - Daily apt upgrade and clean activities.
2025-11-25T07:52:31.447478+00:00 ubuntu systemd[1]: apt-daily-upgrade.service: Consumed 1.858s CPU time.
2025-11-25T07:52:37.349032+00:00 ubuntu systemd[1]: Started session-28.scope - Session 28 of User khadija.
2025-11-25T08:00:01.511079+00:00 ubuntu systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-25T08:00:01.515317+00:00 ubuntu systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-25T08:00:01.515451+00:00 ubuntu systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-25T08:10:04.752696+00:00 ubuntu systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-25T08:10:04.758125+00:00 ubuntu systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-25T08:10:04.758267+00:00 ubuntu systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
```

```
khadija@ubuntu:~$ sudo journalctl | less
khadija@ubuntu:~$ khadija@ubuntu:~$ sudo journalctl -u systemd | grep -i error > ~/journal_errors.txt
khadija@ubuntu:~$
```

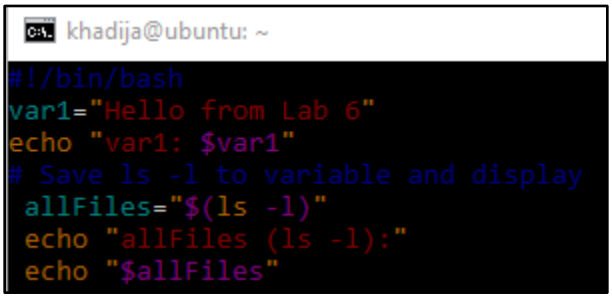
Task 10 - Script setup.sh – variables, command substitution, file/dir checks, permissions (use vim)

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ chmod +x setup.sh
khadija@ubuntu:~$ ./setup.sj
-bash: ./setup.sj: No such file or directory
khadija@ubuntu:~$ ./setup.sh
khadija@ubuntu:~$
```






```
khadija@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
khadija@ubuntu:~$
```



```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 100
-rw-rw-r-- 1 khadija khadija   230 Oct 31 11:36 answers.md
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Desktop
-rw-rw-r-- 1 khadija khadija 25114 Nov  3 07:18 directory_evidence.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Documents
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Downloads
-rw-rw-r-- 1 khadija khadija   308 Nov  3 07:29 forensic_report.md
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:38 Forensics_workspace
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:49 Forensics_workspace_backup
-rw-rw-r-- 1 khadija khadija     0 Nov 25 08:39 journal_errors.txt
drwxrwxr-x 3 khadija khadija  4096 Oct 31 11:36 lab4
drwxrwxr-x 2 khadija khadija  4096 Nov  6 09:00 Lab5
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Music
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Pictures
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Public
-rwxrwxr-x 1 khadija khadija   157 Nov 25 09:31 setup.sh
drwx------ 3 khadija khadija  4096 Nov  3 09:46 snap
-rw-rw-r-- 1 khadija khadija  3263 Nov 25 08:37 syslog_systemd.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Templates
drwxrwxr-t 2 khadija khadija  4096 Nov  3 10:11 thinclient_drives
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Videos
khadija@ubuntu:~$
```

```
#!/bin/bash
var1="Hello from Lab 6"
echo "var1: $var1"
# Save ls -l to variable and display
 allFiles="$(ls -l)"
 echo "allFiles (ls -l):"
 echo "$allFiles"
 if [ -d "dir1" ]; then
            echo "Directory dir1 exists."
   else
              echo "Directory dir1 does not exist. Creating..."
                mkdir -p "dir1"
                  echo "Directory dir1 created."

 fi
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 100
-rw-rw-r-- 1 khadija khadija   230 Oct 31 11:36 answers.md
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Desktop
-rw-rw-r-- 1 khadija khadija 25114 Nov  3 07:18 directory_evidence.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Documents
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Downloads
-rw-rw-r-- 1 khadija khadija   308 Nov  3 07:29 forensic_report.md
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:38 Forensics_workspace
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:49 Forensics_workspace_backup
-rw-rw-r-- 1 khadija khadija     0 Nov 25 08:39 journal_errors.txt
drwxrwxr-x 3 khadija khadija  4096 Oct 31 11:36 lab4
drwxrwxr-x 2 khadija khadija  4096 Nov  6 09:00 Lab5
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Music
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Pictures
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Public
-rwxrwxr-x 1 khadija khadija   348 Nov 25 09:33 setup.sh
drwx------ 3 khadija khadija  4096 Nov  3 09:46 snap
-rw-rw-r-- 1 khadija khadija  3263 Nov 25 08:37 syslog_systemd.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Templates
drwxrwxr-t 2 khadija khadija  4096 Nov  3 10:11 thinclient_drives
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Videos
Directory dir1 does not exist. Creating...
Directory dir1 created.
```

```
#!/bin/bash
var1="Hello from Lab 6"
echo "var1: $var1"
# Save ls -l to variable and display
 allFiles="$(ls -l)"
 echo "allFiles (ls -l):"
 echo "$allFiles"
 if [ -d "dir1" ]; then
           echo "Directory dir1 exists."
   else
             echo "Directory dir1 does not exist. Creating..."
               mkdir -p "dir1"
                 echo "Directory dir1 created."
 fi
 if [ -f "dir1/file2" ]; then
           echo "file2 already exists."
   else
             echo "file2 does not exist. Creating..."
               touch "dir1/file2"
                 chmod a-rwx "dir1/file2"
                   echo "file2 created."
 fi
```

```
#!/bin/bash
var1="Hello from Lab 6"
echo "var1: $var1"
# Save ls -l to variable and display
 allFiles="$(ls -l)"
 echo "allFiles (ls -l):"
 echo "$allFiles"
 if [ -d "dir1" ]; then
           echo "Directory dir1 exists."
   else
             echo "Directory dir1 does not exist. Creating..."
               mkdir -p "dir1"
                 echo "Directory dir1 created."
 fi
 if [ -f "dir1/file2" ]; then
           echo "file2 already exists."
   else
             echo "file2 does not exist. Creating..."
               touch "dir1/file2"
                 chmod a-rwx "dir1/file2"
                   echo "file2 created."
 fi
 f="dir1/file2"
 if [ ! -r "$f" ]; then
           echo "Read permission missing; granting to user..."
             chmod u+r "$f"
 fi

 if [ ! -w "$f" ]; then
           echo "Write permission missing; granting to user..."
             chmod u+w "$f"
 fi

 if [ ! -x "$f" ]; then
           echo "Execute permission missing; granting to user..."
             chmod u+x "$f"
 fi

 echo "Final permissions for $f:"
 ls -l "$f"
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 104
-rw-rw-r-- 1 khadija khadija   230 Oct 31 11:36 answers.md
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Desktop
drwxrwxr-x 2 khadija khadija  4096 Nov 25 09:35 dir1
-rw-rw-r-- 1 khadija khadija 25114 Nov  3 07:18 directory_evidence.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Documents
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Downloads
-rw-rw-r-- 1 khadija khadija   308 Nov  3 07:29 forensic_report.md
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:38 Forensics_workspace
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:49 Forensics_workspace_backup
-rw-rw-r-- 1 khadija khadija     0 Nov 25 08:39 journal_errors.txt
drwxrwxr-x 3 khadija khadija  4096 Oct 31 11:36 lab4
drwxrwxr-x 2 khadija khadija  4096 Nov  6 09:00 Lab5
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Music
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Pictures
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Public
-rwxrwxr-x 1 khadija khadija   943 Nov 25 09:38 setup.sh
drwx------ 3 khadija khadija  4096 Nov  3 09:46 snap
-rw-rw-r-- 1 khadija khadija  3263 Nov 25 08:37 syslog_systemd.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Templates
drwxrwxr-t 2 khadija khadija  4096 Nov  3 10:11 thinclient_drives
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Videos
Directory dir1 exists.
file2 already exists.
Read permission missing; granting to user...
Write permission missing; granting to user...
Execute permission missing; granting to user...
Final permissions for dir1/file2:
-rwx------ 1 khadija khadija 0 Nov 25 09:35 dir1/file2
khadija@ubuntu:~$
```

Task 11 - Script setup.sh – argument comparisons (eq, ne, gt, lt, ge, le) and string checks

```
khadija@ubuntu: ~
#!/bin/bash
num=$1
str=$2
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ chmod +x setup.sh
khadija@ubuntu:~$ ./setup.sh 10 student
khadija@ubuntu:~$
```

```
khadija@ubuntu: ~
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
          echo "$num is equal to 10 (-eq)."
  else
            echo "$num is NOT equal to 10 (-eq)."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
khadija@ubuntu:~$ ./setup.sh 7 student
7 is NOT equal to 10 (-eq).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
  else
          echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
        echo "$num is not equal to 10 (-ne)."
  else
          echo "$num is equal to 10 (-ne false)."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 7 Student
7 is NOT equal to 10 (-eq).
7 is not equal to 10 (-ne).
khadija@ubuntu:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
  else
          echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
        echo "$num is not equal to 10 (-ne)."
  else
          echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
        echo "$num is greater than 10 (-gt)."
  else
          echo "$num is NOT greater than 10 (-gt)."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 12 Student
12 is NOT equal to 10 (-eq).
12 is not equal to 10 (-ne).
12 is greater than 10 (-gt).
khadija@ubuntu:~$ ./setup.sh 9 Student
9 is NOT equal to 10 (-eq).
9 is not equal to 10 (-ne).
9 is NOT greater than 10 (-gt).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
          echo "$num is equal to 10 (-eq)."
  else
            echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
          echo "$num is not equal to 10 (-ne)."
  else
            echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
          echo "$num is greater than 10 (-gt)."
  else
            echo "$num is NOT greater than 10 (-gt)."
fi
if [ "$num" -lt 10 ]; then
          echo "$num is less than 10 (-lt)."
  else
            echo "$num is NOT less than 10 (-lt)."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 5 Student
5 is NOT equal to 10 (-eq).
5 is not equal to 10 (-ne).
5 is NOT greater than 10 (-gt).
5 is less than 10 (-lt).
khadija@ubuntu:~$ ./setup.sh 11 Student
11 is NOT equal to 10 (-eq).
11 is not equal to 10 (-ne).
11 is greater than 10 (-gt).
11 is NOT less than 10 (-lt).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
          echo "$num is equal to 10 (-eq)."
  else
            echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
          echo "$num is not equal to 10 (-ne)."
  else
            echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
          echo "$num is greater than 10 (-gt)."
  else
            echo "$num is NOT greater than 10 (-gt)."
fi
if [ "$num" -lt 10 ]; then
          echo "$num is less than 10 (-lt)."
  else
            echo "$num is NOT less than 10 (-lt)."
fi
if [ "$num" -ge 10 ]; then
          echo "$num is greater than or equal to 10 (-ge)."
  else
            echo "$num is NOT greater than or equal to 10 (-ge)."
fi
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
khadija@ubuntu:~$ ./setup.sh 8 Student
8 is NOT equal to 10 (-eq).
8 is not equal to 10 (-ne).
8 is NOT greater than 10 (-gt).
8 is less than 10 (-lt).
8 is NOT greater than or equal to 10 (-ge).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
          echo "$num is equal to 10 (-eq)."
  else
            echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
          echo "$num is not equal to 10 (-ne)."
  else
            echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
          echo "$num is greater than 10 (-gt)."
  else
            echo "$num is NOT greater than 10 (-gt)."
fi
if [ "$num" -lt 10 ]; then
          echo "$num is less than 10 (-lt)."
  else
            echo "$num is NOT less than 10 (-lt)."
fi
if [ "$num" -ge 10 ]; then
          echo "$num is greater than or equal to 10 (-ge)."
  else
            echo "$num is NOT greater than or equal to 10 (-ge)."
fi
if [ "$num" -le 10 ]; then
          echo "$num is less than or equal to 10 (-le)."
  else
            echo "$num is NOT less than or equal to 10 (-le)."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
khadija@ubuntu:~$ ./setup.sh 12 Student
12 is NOT equal to 10 (-eq).
12 is not equal to 10 (-ne).
12 is greater than 10 (-gt).
12 is NOT less than 10 (-lt).
12 is greater than or equal to 10 (-ge).
12 is NOT less than or equal to 10 (-le).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
  else
          echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
        echo "$num is not equal to 10 (-ne)."
  else
          echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
        echo "$num is greater than 10 (-gt)."
  else
          echo "$num is NOT greater than 10 (-gt)."
fi
if [ "$num" -lt 10 ]; then
        echo "$num is less than 10 (-lt)."
  else
          echo "$num is NOT less than 10 (-lt)."
fi
if [ "$num" -ge 10 ]; then
        echo "$num is greater than or equal to 10 (-ge)."
  else
          echo "$num is NOT greater than or equal to 10 (-ge)."
fi
if [ "$num" -le 10 ]; then
        echo "$num is less than or equal to 10 (-le)."
  else
          echo "$num is NOT less than or equal to 10 (-le)."
fi
if [ "$str" = "Student" ]; then
        echo "Second argument equals 'Student' ( = )."
  else
          echo "Second argument does NOT equal 'Student' ( = )."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument equals 'Student' ( = ).
khadija@ubuntu:~$ ./setup.sh 10 Test
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal 'Student' ( = ).
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
  else
          echo "$num is NOT equal to 10 (-eq)."
fi
if [ "$num" -ne 10 ]; then
        echo "$num is not equal to 10 (-ne)."
  else
          echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
        echo "$num is greater than 10 (-gt)."
  else
          echo "$num is NOT greater than 10 (-gt)."
fi
if [ "$num" -lt 10 ]; then
        echo "$num is less than 10 (-lt)."
  else
          echo "$num is NOT less than 10 (-lt)."
fi
if [ "$num" -ge 10 ]; then
        echo "$num is greater than or equal to 10 (-ge)."
  else
          echo "$num is NOT greater than or equal to 10 (-ge)."
fi
if [ "$num" -le 10 ]; then
        echo "$num is less than or equal to 10 (-le)."
  else
          echo "$num is NOT less than or equal to 10 (-le)."
fi
if [ "$str" = "Student" ]; then
        echo "Second argument equals 'Student' ( = )."
  else
          echo "Second argument does NOT equal 'Student' ( = )."
fi
if [ "$str" != "Student" ]; then
        echo "Second argument is not equal to 'Student' ( != )."
  else
          echo "Second argument equals 'Student' ( != false)."
fi
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 10 Test
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal 'Student' ( = ).
Second argument is not equal to 'Student' ( != ).
khadija@ubuntu:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument equals 'Student' ( = ).
Second argument equals 'Student' ( != false).
khadija@ubuntu:~$
```

```
if [ "$str" != "Student" ]; then
        echo "Second argument is not equal to 'Student' ( != )."
  else
          echo "Second argument equals 'Student' ( != false)."
fi
if [ -z "$str" ]; then
        echo "Second argument is empty (zero-length)."
  else
          echo "Second argument is not empty."
fi
if [ -z "$str" ]; then
        echo "Second argument is empty (zero-length)."
  else
          echo "Second argument is not empty."
fi
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ ./setup.sh 10
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal 'Student' ( = ).
Second argument is not equal to 'Student' ( != ).
Second argument is empty (zero-length).
Second argument is empty (zero-length).
khadija@ubuntu:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument equals 'Student' ( = ).
Second argument equals 'Student' ( != false).
Second argument is not empty.
Second argument is not empty.
khadija@ubuntu:~$
```

Task 12 - Script setup.sh – print all arguments with a for loop

khadija@ubuntu: ~

```
#!/bin/bash
## Script to demonstrate printing all user-entered arguments using $*
~
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ ./setup.sh
```

khadija@ubuntu: ~

```
#!/bin/bash
## Script to demonstrate printing all user-entered arguments using $*
echo "Printing all arguments using \$*:"
for arg in $*; do
        echo "Argument: $arg"
  done
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh one "two words" three
Printing all arguments using $*:
Argument: one
Argument: two
Argument: words
Argument: three
khadija@ubuntu:~$
```

Task 13 – Script setup.sh – while loop summation and functions

```
khadija@ubuntu: ~
#!/bin/bash
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ ./setup.sh
khadija@ubuntu:~$
```

```
#!/bin/bash
sum=0
while true; do
          read -p "Enter a number (or 'q' to quit): " input
            if [ "$input" = "q" ]; then
                        break
                          fi

                             sum=$((sum + input))
                               echo "Total Score: $sum"
                    done
                    echo "Final total: $sum"
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
Enter a number (or 'q' to quit): 5
Total Score: 5
Enter a number (or 'q' to quit): 7
Total Score: 12
Enter a number (or 'q' to quit): q
Final total: 12
khadija@ubuntu:~$
```

khadija@ubuntu: ~

```
#!/bin/bash
sum=0
while true; do
          read -p "Enter a number (or 'q' to quit): " input
            if [ "$input" = "q" ]; then
                        break
                          fi

                             sum=$((sum + input))
                               echo "Total Score: $sum"
                      done
                      echo "Final total: $sum"
sum_two() {
          sum=0
            while true; do
                        read -p "Enter a number (or 'q' to quit): " input
                            if [ "$input" = "q" ]; then
                                        break
                                            fi

                                                sum=$((sum + input))
                                                    echo "Total Score: $sum"
                                                      done
                                                        echo "Function final total: $sum"
                                                }

                                                # Demonstrate the function
                                                # echo "Now calling sum_two function:"
                                                # sum_two
```

khadija@ubuntu: ~

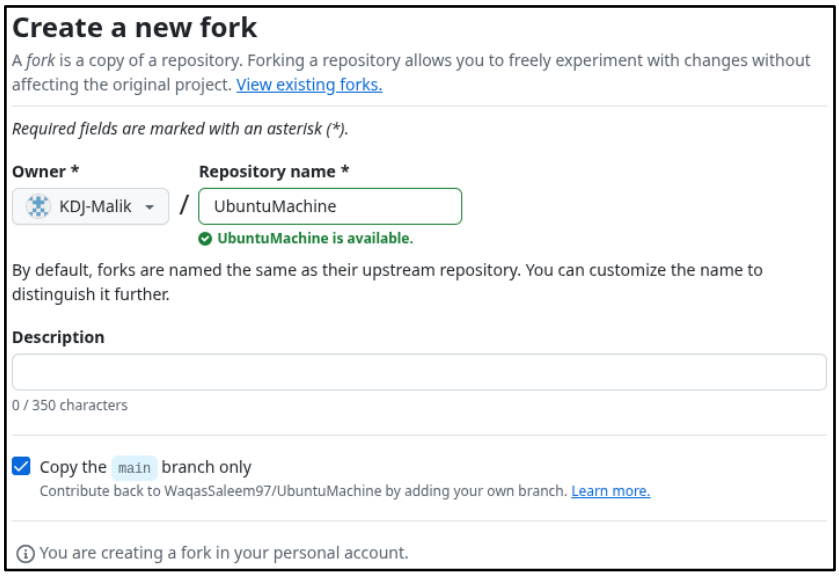
```
#!/bin/bash
sum_two() {
          sum=0
            while true; do
                        read -p "Enter a number (or 'q' to quit): " input
                            if [ "$input" = "q" ]; then
                                        break
                                            fi

                                                sum=$((sum + input))
                                                    echo "Total Score: $sum"
                                                      done
                                                        echo "Function final total: $sum"
                                                }

                                                # Demonstrate the function
                                                 echo "Now calling sum_two function:"
                                                 sum_two
```

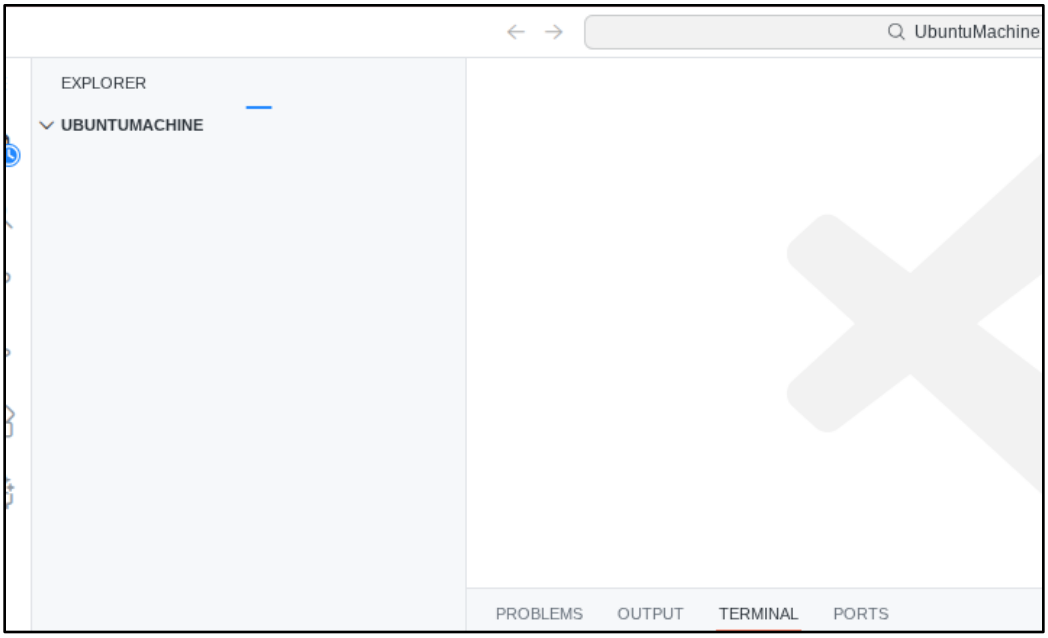
```
khadija@ubuntu:~$ ./setup.sh
Now calling sum_two function:
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 4
Total Score: 7
Enter a number (or 'q' to quit): q
Function final total: 7
khadija@ubuntu:~$
```

```
khadija@ubuntu: ~
#!/bin/bash
sum_two() {
          sum=0
            while true; do
                        read -p "Enter a number (or 'q' to quit): " input
                            if [ "$input" = "q" ]; then
                                        break
                                            fi

                                                    sum=$((sum + input))
                                                        echo "Total Score: $sum"
                                                          done
                                                            echo "Function final total: $sum"
                                                    }

                                                    # Demonstrate the function
                                                     echo "Now calling sum_two function:"
                                                     sum_two
sum_args() {
          a=$1
            b=$2
              return $((a + b))
      }

      # Demonstrate sum_args function
       echo "Now demonstrating sum_args function:"
       sum_args 3 4
       result=$?
       echo "sum_args(3,4) returned: $result"
```

```
khadija@ubuntu:~$ vim ./setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
Now calling sum_two function:
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 2
Total Score: 5
Enter a number (or 'q' to quit): 1
Total Score: 6
Enter a number (or 'q' to quit): q
Function final total: 6
Now demonstrating sum_args function:
sum_args(3,4) returned: 7
khadija@ubuntu:~$
```

Task 14 - Codespaces GUI — fork repo, run start-desktop.sh, open VNC, stop GUI



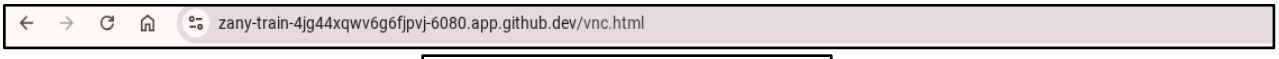


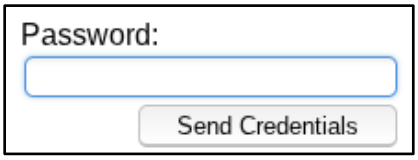

```
@KDJ-Malik ➜ /workspaces/UbuntuMachine (main) $ ls -l start-desktop.sh stop-desktop.sh
-rwxrwxrwx 1 codespace root 1333 Nov 24 07:51 start-desktop.sh
-rwxrwxrwx 1 codespace root  428 Nov 24 07:51 stop-desktop.sh
@KDJ-Malik ➜ /workspaces/UbuntuMachine (main) $
```

```
[✔] XFCE desktop environment is running!
🌐 Access it via the Codespaces HTTPS port (6080)
@KDJ-Malik ➜ /workspaces/UbuntuMachine (main) $
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS 3

Port	Forwarded Address	Running Process	Visibility	Origin
5900	https://zany-train-4jg…	x11vnc -display :1 -rfbauth /home/codespace/.…	Private	Codespaces: zany train
5901	https://zany-train-4jg…	x11vnc -display :1 -rfbauth /home/codespace/.…	Private	Codespaces: zany train
6080	https://zany-train-4jg…	/usr/bin/python3 /usr/bin/websockify --web /us…	Private	Codespaces: zany train





```
@KDJ-Malik ➜ /workspaces/UbuntuMachine (main) $ ./stop-desktop.sh
[*] Stopping noVNC server...

Terminating WebSockets proxy (25469)
[*] Stopping x11vnc server...
In exit
caught signal: 15
24/11/2025 08:17:13 deleted 60 tile_row polling images.
[*] Stopping XFCE desktop session...
[*] Stopping virtual X server (Xvfb)...
[✓] All services stopped.

(xfce4-power-manager:25316): libxfce4ui-WARNING **: 08:17:13.050: ICE I/O Error

(xfce4-power-manager:25316): libxfce4ui-WARNING **: 08:17:13.050: Disconnected from session manager.

(xfsettingsd:25261): libxfce4ui-WARNING **: 08:17:13.051: ICE I/O Error

(xfsettingsd:25261): libxfce4ui-WARNING **: 08:17:13.051: Disconnected from session manager.

(xfce4-panel:25266): libxfce4ui-WARNING **: 08:17:13.051: ICE I/O Error

(xfce4-panel:25266): libxfce4ui-WARNING **: 08:17:13.055: Disconnected from session manager.

(xfce4-panel:25266): xfce4-panel-CRITICAL **: 08:17:13.056: Name org.xfce.Panel lost on the message dbus, exiting.

(xfwm4:25248): libxfce4ui-WARNING **: 08:17:13.051: ICE I/O Error

(xfwm4:25248): libxfce4ui-WARNING **: 08:17:13.057: Disconnected from session manager.
xfsettingsd: Another instance took over. Leaving...
```

Exam Evaluation Question

1. Group Management and Membership

```
khadija@ubuntu:~$ sudo groupadd g1
[sudo] password for khadija:
khadija@ubuntu:~$ sudo groupadd g2
khadija@ubuntu:~$ sudo groupadd g3
khadija@ubuntu:~$ getent group g1 g2 g3
g1:x:1006:
g2:x:1007:
g3:x:1008:
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo adduser examuser
info: Adding user `examuser' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `examuser' (1009) ...
info: Adding new user `examuser' (1009) with group `examuser (1009)' ...
info: Creating home directory `/home/examuser' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for examuser
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
info: Adding new user `examuser' to supplemental / extra groups `users' ...
info: Adding user `examuser' to group `users' ...
khadija@ubuntu:~$ sudo usermod -g g3 examuser
khadija@ubuntu:~$ sudo usermod -aG g1,g2 examuser
```

```
khadija@ubuntu:~$ id examuser
uid=1009(examuser) gid=1008(g3) groups=1008(g3),100(users),1006(g1),1007(g2)
khadija@ubuntu:~$ grep -E "g1|g2|g3|examuser" /etc/group
users:x:100:student,examuser
g1:x:1006:examuser
g2:x:1007:examuser
g3:x:1008:
examuser:x:1009:
khadija@ubuntu:~$
```


2. Ownership and Permission Tasks

```
khadija@ubuntu:~$ mkdir -p workspace
khadija@ubuntu:~$ touch workspace/secret.txt
khadija@ubuntu:~$ sudo chown examuser:g1 workspace/secret.txt
[sudo] password for khadija:
khadija@ubuntu:~$ ls -l workspace/secret.txt
-rw-rw-r-- 1 examuser g1 0 Nov 27 07:24 workspace/secret.txt
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo chmod go-rwx workspace/secret.txt
khadija@ubuntu:~$ ls -l workspace/secret.txt
-rw------- 1 examuser g1 0 Nov 27 07:24 workspace/secret.txt
khadija@ubuntu:~$
```

```
khadija@ubuntu:~$ sudo chmod 600 workspace/secret.txt
khadija@ubuntu:~$ ls -l workspace/secret.txt
-rw------- 1 examuser g1 0 Nov 27 07:24 workspace/secret.txt
khadija@ubuntu:~$
```

3. Pipes, Grep, and Redirection Practice

```
khadija@ubuntu:~$ grep -Ei "error|fail" /var/log/syslog | head -20
2025-11-25T07:52:29.674340+00:00 ubuntu apt-helper[10223]: E: Sub-process nm
-online returned an error code (1)
2025-11-25T09:05:14.746933+00:00 ubuntu apt-helper[11229]: E: Sub-process nm
-online returned an error code (1)
2025-11-27T06:48:42.820490+00:00 ubuntu NetworkManager[872]: <info>  [176422
6122.8197] audit: op="sleep-control" arg="off" pid=12796 uid=0 result="fail"
 reason="Already awake"
2025-11-27T06:49:12.627023+00:00 ubuntu apt-helper[12553]: E: Sub-process nm
-online returned an error code (1)
2025-11-27T06:49:12.636308+00:00 ubuntu apt-helper[12619]: E: Sub-process nm
-online returned an error code (1)
khadija@ubuntu:~$ grep -Ei "error|fail" /var/log/syslog > ~/logs/errors.txt
-bash: /home/khadija/logs/errors.txt: No such file or directory
khadija@ubuntu:~$ mkdir -p ~/logs
khadija@ubuntu:~$ grep -Ei "critical|warning" /var/log/syslog >> ~/logs/erro
rs.txt
khadija@ubuntu:~$
```

```
2025-11-27T06:49:20.544500+00:00 ubuntu apt.systemd.daily[12891]: /usr/bin/u
nattended-upgrade:567: DeprecationWarning: This process (pid=12891) is multi
-threaded, use of fork() may lead to deadlocks in the child.
2025-11-27T06:49:30.355149+00:00 ubuntu apt.systemd.daily[12891]: /usr/bin/u
nattended-upgrade:567: DeprecationWarning: This process (pid=12891) is multi
-threaded, use of fork() may lead to deadlocks in the child.
2025-11-27T06:49:37.436993+00:00 ubuntu apt.systemd.daily[12891]: /usr/bin/u
nattended-upgrade:567: DeprecationWarning: This process (pid=12891) is multi
-threaded, use of fork() may lead to deadlocks in the child.
2025-11-27T06:49:44.598897+00:00 ubuntu apt.systemd.daily[12891]: /usr/bin/u
nattended-upgrade:567: DeprecationWarning: This process (pid=12891) is multi
-threaded, use of fork() may lead to deadlocks in the child.
2025-11-27T06:49:51.739174+00:00 ubuntu apt.systemd.daily[12891]: /usr/bin/u
nattended-upgrade:567: DeprecationWarning: This process (pid=12891) is multi
-threaded, use of fork() may lead to deadlocks in the child.
(END)
```

4. Script: Variables, Command Substitution, File & Dir Checks

```
  GNU nano 7.2                                  setup.sh
#!/bin/bash
var1="Hello from var1"
echo "$var1"
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ nano setup.sh
khadija@ubuntu:~$ sudo chmod +x setup.sh
[sudo] password for khadija:
khadija@ubuntu:~$ ./setup.sh
Hello from var1
khadija@ubuntu:~$
```

```
khadija@ubuntu: ~
  GNU nano 7.2
#!/bin/bash
allfiles="$(ls -l)"
echo "All files in  this directory"
echo "$allfiles"
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
All files in  this directory
total 112
-rw-rw-r-- 1 khadija khadija   230 Oct 31 11:36 answers.md
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Desktop
drwxrwxr-x 2 khadija khadija  4096 Nov 25 09:35 dir1
-rw-rw-r-- 1 khadija khadija 25114 Nov  3 07:18 directory_evidence.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Documents
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Downloads
-rw-rw-r-- 1 khadija khadija   308 Nov  3 07:29 forensic_report.md
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:38 Forensics_workspace
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:49 Forensics_workspace_backup
-rw-rw-r-- 1 khadija khadija     0 Nov 25 08:39 journal_errors.txt
drwxrwxr-x 3 khadija khadija  4096 Oct 31 11:36 lab4
drwxrwxr-x 2 khadija khadija  4096 Nov  6 09:00 Lab5
drwxrwxr-x 2 khadija khadija  4096 Nov 27 07:37 logs
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Music
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Pictures
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Public
-rwxrwxr-x 1 khadija khadija    85 Nov 27 07:50 setup.sh
drwx------ 3 khadija khadija  4096 Nov  3 09:46 snap
-rw-rw-r-- 1 khadija khadija  3263 Nov 25 08:37 syslog_systemd.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Templates
drwxrwxr-t 2 khadija khadija  4096 Nov  3 10:11 thinclient_drives
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Videos
drwxrwxr-x 2 khadija khadija  4096 Nov 27 07:24 workspace
```

```
 GNU nano 7.2                                                  setup
#!/bin/bash
allfiles="$(ls -l)"
echo "All files in  this directory"
echo "$allfiles"
if [ ! -d dir1 ]; then
    echo "dir1 does not exist. Creating dir1..."
    mkdir dir1
else
    echo "dir1 already exists."
fi
if [ ! -f dir1/file2 ]; then
    echo "file2 does not exist inside dir1. Creating file2..."
    touch dir1/file2
else
    echo "file2 already exists."
fi
echo "Final permissions:"
ls -ld dir1
ls -l dir1/file2
```

```
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
All files in  this directory
total 112
-rw-rw-r-- 1 khadija khadija   230 Oct 31 11:36 answers.md
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Desktop
drwxrwxr-x 2 khadija khadija  4096 Nov 25 09:35 dir1
-rw-rw-r-- 1 khadija khadija 25114 Nov  3 07:18 directory_evidence.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Documents
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Downloads
-rw-rw-r-- 1 khadija khadija   308 Nov  3 07:29 forensic_report.md
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:38 Forensics_workspace
drwxrwxr-x 3 khadija khadija  4096 Nov  3 07:49 Forensics_workspace_backup
-rw-rw-r-- 1 khadija khadija     0 Nov 25 08:39 journal_errors.txt
drwxrwxr-x 3 khadija khadija  4096 Oct 31 11:36 lab4
drwxrwxr-x 2 khadija khadija  4096 Nov  6 09:00 Lab5
drwxrwxr-x 2 khadija khadija  4096 Nov 27 07:37 logs
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Music
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Pictures
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Public
-rwxrwxr-x 1 khadija khadija   421 Dec  8 05:05 setup.sh
drwx------ 3 khadija khadija  4096 Nov  3 09:46 snap
-rw-rw-r-- 1 khadija khadija  3263 Nov 25 08:37 syslog_systemd.txt
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Templates
drwxrwxr-t 2 khadija khadija  4096 Nov  3 10:11 thinclient_drives
drwxr-xr-x 2 khadija khadija  4096 Nov  3 10:11 Videos
drwxrwxr-x 2 khadija khadija  4096 Nov 27 07:24 workspace
dir1 already exists.
file2 already exists.
Final permissions:
drwxrwxr-x 2 khadija khadija 4096 Nov 25 09:35 dir1
-rwx------ 1 khadija khadija 0 Nov 25 09:35 dir1/file2
```

5. Script: Comparisons and String Tests

khadija@ubuntu: ~

GNU nano 7.2

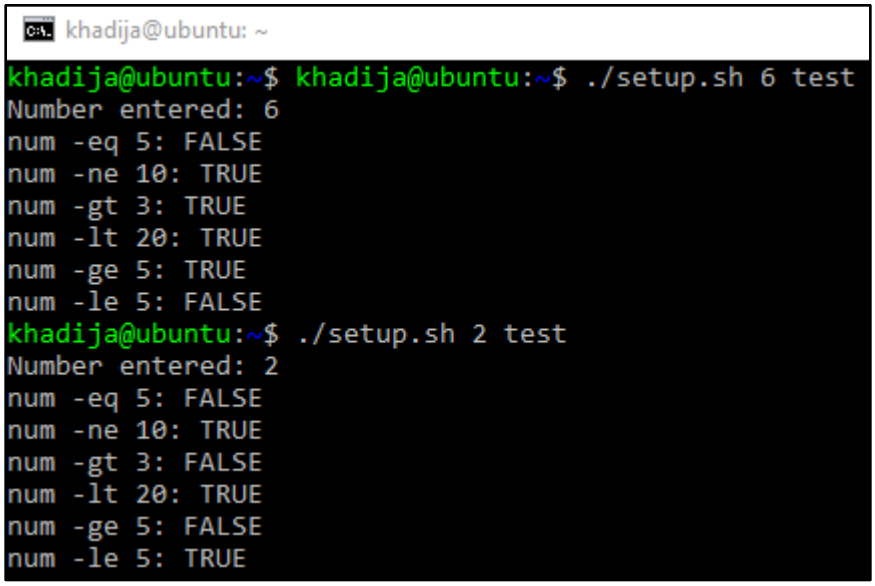
```
#!/bin/bash
num=$1
str=$2
echo "Number entered: $num"
if [ "$num" -eq 5 ]; then
    echo "num -eq 5: TRUE"
else
    echo "num -eq 5: FALSE"
fi
```

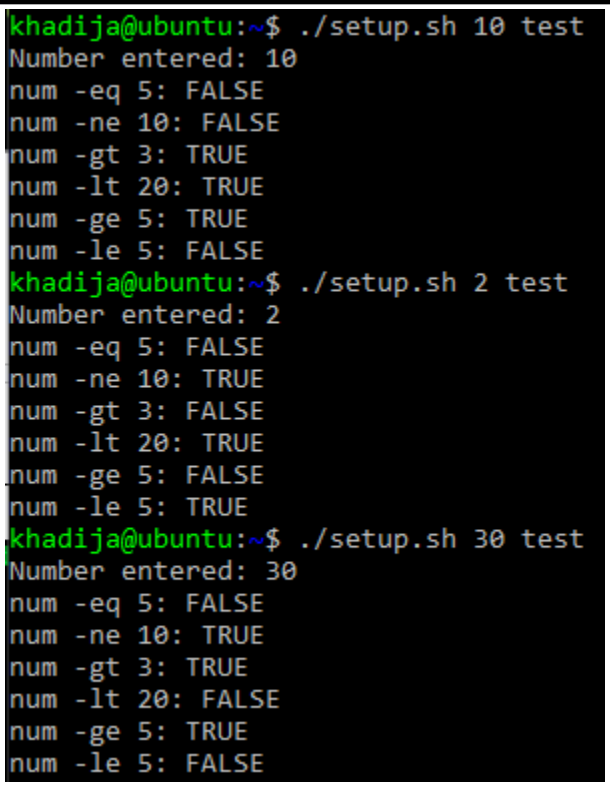
```
khadija@ubuntu:~$ nano setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 5 abc
Number entered: 5
num -eq 5: TRUE
khadija@ubuntu:~$ ./setup.sh 7 xyz
Number entered: 7
num -eq 5: FALSE
khadija@ubuntu:~$
```

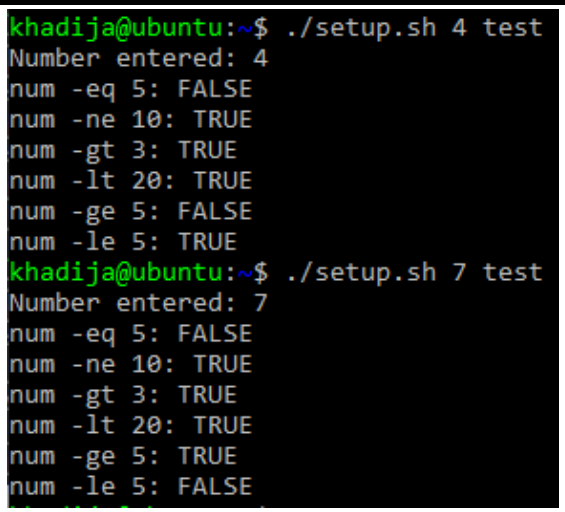
khadija@ubuntu: ~

GNU nano 7.2

```
#!/bin/bash
num=$1
str=$2
echo "Number entered: $num"
if [ "$num" -eq 5 ]; then
    echo "num -eq 5: TRUE"
else
    echo "num -eq 5: FALSE"
fi
if [ "$num" -ne 10 ]; then
    echo "num -ne 10: TRUE"
else
    echo "num -ne 10: FALSE"
fi
if [ "$num" -gt 3 ]; then
    echo "num -gt 3: TRUE"
else
    echo "num -gt 3: FALSE"
fi
if [ "$num" -lt 20 ]; then
    echo "num -lt 20: TRUE"
else
    echo "num -lt 20: FALSE"
fi
if [ "$num" -ge 5 ]; then
    echo "num -ge 5: TRUE"
else
    echo "num -ge 5: FALSE"
fi
if [ "$num" -le 5 ]; then
    echo "num -le 5: TRUE"
else
    echo "num -le 5: FALSE"
fi
```


khadija@ubuntu: ~
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh 6 test
Number entered: 6
num -eq 5: FALSE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: FALSE
khadija@ubuntu:~$ ./setup.sh 2 test
Number entered: 2
num -eq 5: FALSE
num -ne 10: TRUE
num -gt 3: FALSE
num -lt 20: TRUE
num -ge 5: FALSE
num -le 5: TRUE


khadija@ubuntu:~$ ./setup.sh 10 test
Number entered: 10
num -eq 5: FALSE
num -ne 10: FALSE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: FALSE
khadija@ubuntu:~$ ./setup.sh 2 test
Number entered: 2
num -eq 5: FALSE
num -ne 10: TRUE
num -gt 3: FALSE
num -lt 20: TRUE
num -ge 5: FALSE
num -le 5: TRUE
khadija@ubuntu:~$ ./setup.sh 30 test
Number entered: 30
num -eq 5: FALSE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: FALSE
num -ge 5: TRUE
num -le 5: FALSE


khadija@ubuntu:~$ ./setup.sh 4 test
Number entered: 4
num -eq 5: FALSE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: FALSE
num -le 5: TRUE
khadija@ubuntu:~$ ./setup.sh 7 test
Number entered: 7
num -eq 5: FALSE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: FALSE

```
echo "String entered: '$str'"
if [ "$str" = "hello" ]; then
    echo "str = hello: TRUE"
else
    echo "str = hello: FALSE"
fi
if [ "$str" != "hello" ]; then
    echo "str != hello: TRUE"
else
    echo "str != hello: FALSE"
fi
if [ -z "$str" ]; then
    echo "str is empty (-z): TRUE"
else
    echo "str is empty (-z): FALSE"
fi
```

```
khadija@ubuntu:~$ nano setup.sh
khadija@ubuntu:~$ ./setup.sh 5 hello
Number entered: 5
num -eq 5: TRUE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: TRUE
String entered: 'hello'
str = hello: TRUE
str != hello: FALSE
str is empty (-z): FALSE
khadija@ubuntu:~$ ./setup.sh 5 world
Number entered: 5
num -eq 5: TRUE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: TRUE
String entered: 'world'
str = hello: FALSE
str != hello: TRUE
str is empty (-z): FALSE
khadija@ubuntu:~$ ./setup.sh 5 abc
Number entered: 5
num -eq 5: TRUE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: TRUE
String entered: 'abc'
str = hello: FALSE
str != hello: TRUE
str is empty (-z): FALSE
```

```
khadija@ubuntu:~$ ./setup.sh 5 hello
Number entered: 5
num -eq 5: TRUE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: TRUE
String entered: 'hello'
str = hello: TRUE
str != hello: FALSE
str is empty (-z): FALSE
khadija@ubuntu:~$ ./setup.sh 5 ""
Number entered: 5
num -eq 5: TRUE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: TRUE
String entered: ''
str = hello: FALSE
str != hello: TRUE
str is empty (-z): TRUE
khadija@ubuntu:~$ ./setup.sh 5 hi
Number entered: 5
num -eq 5: TRUE
num -ne 10: TRUE
num -gt 3: TRUE
num -lt 20: TRUE
num -ge 5: TRUE
num -le 5: TRUE
String entered: 'hi'
str = hello: FALSE
str != hello: TRUE
str is empty (-z): FALSE
khadija@ubuntu:~$
```

6. Script: For Loop and Argument Handling

```
khadija@ubuntu: ~
#!/bin/bash
echo "Printing all arguments:"
for arg in "$@"
do
        echo "$arg"
done
```

```
khadija@ubuntu:~$ vim setup.sh
khadija@ubuntu:~$ ./setup.sh apple "red fruit" 'yellow big banana' orange "two words" "another  three   words"
Printing all arguments:
apple
red fruit
yellow big banana
orange
two words
another  three   words
khadija@ubuntu:~$
```

7. Script: While Loop Summation and Functions

```
khadija@ubuntu: ~
  GNU nano 7.2
#!/bin/bash
echo "Enter numbers to add. Enter q to quit."

total=0

while true
do
    read -p "Enter number (or q to quit): " input

    if [ "$input" = "q" ]; then
        echo "Final total: $total"
        break
    fi

    total=$(( total + input ))
    echo "Running total: $total"
done
```

```
khadija@ubuntu:~$ nano setup.sh
khadija@ubuntu:~$ khadija@ubuntu:~$ ./setup.sh
Enter numbers to add. Enter q to quit.
Enter number (or q to quit): 5
Running total: 5
Enter number (or q to quit): 10
Running total: 15
Enter number (or q to quit): 3
Running total: 18
Enter number (or q to quit): q
Final total: 18
khadija@ubuntu:~$
```

```bash
#!/bin/bash
echo "Enter numbers to add. Enter q to quit."

total=0

while true
do
    read -p "Enter number (or q to quit): " input

    if [ "$input" = "q" ]; then
        echo "Final total: $total"
        break
    fi

    total=$(( total + input ))
    echo "Running total: $total"
done
add_two() {
    local a=$1
    local b=$2
    local result=$(( a + b ))
    echo "$result"
}

echo "Demonstrating function add_two:"
value=$(add_two 7 8)
echo "Result of add_two 7 8 is: $value"
```

```
khadija@ubuntu:~$ nano setup.sh
khadija@ubuntu:~$ ./setup.sh
Enter numbers to add. Enter q to quit.
Enter number (or q to quit): 3
Running total: 3
Enter number (or q to quit): 7
Running total: 10
Enter number (or q to quit): q
Final total: 10
Demonstrating function add_two:
Result of add_two 7 8 is: 15
khadija@ubuntu:~$
```

END