1. List the user commands (files in /usr/bin) and redirect the output to /tmp/commands.list

```
eslam@ITI:~$ compgen -c >> /tmp/commands.list
eslam@ITI:~$ ls /tmp
commands.list
gdm3-config-err-EiJHrk
hsperfdata_eslam
hsperfdata_root
lu16387j47k5.tmp
OSL_PIPE_1000_SingleOfficeIPC_c18a83656478beb70eb457341dce7d
snap-private-tmp
systemd-private-e866d9513865415abc7725fb2f468045-bluetooth.service-DDZvMV
systemd-private-e866d9513865415abc7725fb2f468045-colord.service-jdRgtg
systemd-private-e866d9513865415abc7725fb2f468045-fwupd.service-edhxJf
systemd-private-e866d9513865415abc7725fb2f468045-ModemManager.service-SO1hTd
systemd-private-e866d9513865415abc7725fb2f468045-polkit.service-XKKf6C
systemd-private-e866d9513865415abc7725fb2f468045-power-profiles-daemon.service-uQN
systemd-private-e866d9513865415abc7725fb2f468045-switcheroo-control.service-p4lW6u
systemd-private-e866d9513865415abc7725fb2f468045-systemd-logind.service-fYgz8t
systemd-private-e866d9513865415abc7725fb2f468045-systemd-oomd.service-3ZaxcB
systemd-private-e866d9513865415abc7725fb2f468045-systemd-resolved.service-qoPggk
systemd-private-e866d9513865415abc7725fb2f468045-systemd-timesyncd.service-8srNud
systemd-private-e866d9513865415abc7725fb2f468045-upower.service-9yQyWs
eslam@ITI:~$ cat /tmp/commands.list
alert
egrep
fgrep
```

2. Compress a file by compress, gzip, pack, zip commands and decompress it again. State the differences between compress and gzip commands.

```
eslam@ITI:~$ ls -li test5
9574885 -rw-rw-r-- 1 eslam eslam 91056 Jun 12 12:58 test5
eslam@ITI:~$ gzip test5
eslam@ITI:~$ ls -li test5.gz
9602704 -rw-rw-r-- 1 eslam eslam 4639 Jun 12 12:58 test5.gz
eslam@ITI:~$ gunzip test5.gz
eslam@ITI:~$ ls -li test5
9602813 -rw-rw-r-- 1 eslam eslam 91056 Jun 12 12:58 test5
eslam@ITI:~$
```

```
eslam@ITI:~$ ls -li test5
9589509 -rw-rw-r-- 1 eslam eslam 91056 Jun 12 10:52 test5
eslam@ITI:~$ compress test5
eslam@ITI:~$ ls -li test5
ls: cannot access 'test5': No such file or directory
eslam@ITI:~$ ls -li test5.Z
9580933 -rw-rw-r-- 1 eslam eslam 28113 Jun 12 10:52 test5.Z
eslam@ITI:~$ uncompress test5.Z
```

```
eslam@ITI:~$ pack test5 test5.z
Packing test5 into test5.z...

Input size: 91056
Output size: 37637
41%
```

```
eslam@ITI:~$ pack u test5.z test5
Unpacking test5.z into test5...

Input size: 37637
Output size: 91056
242%
```
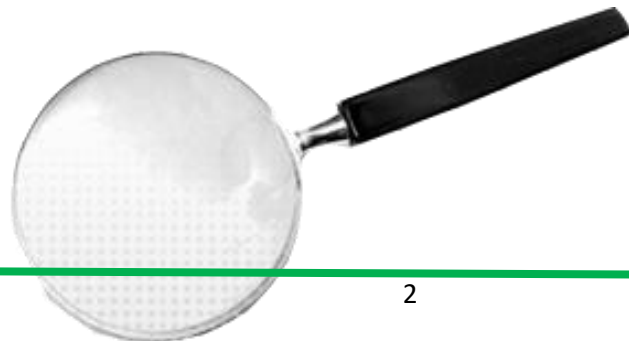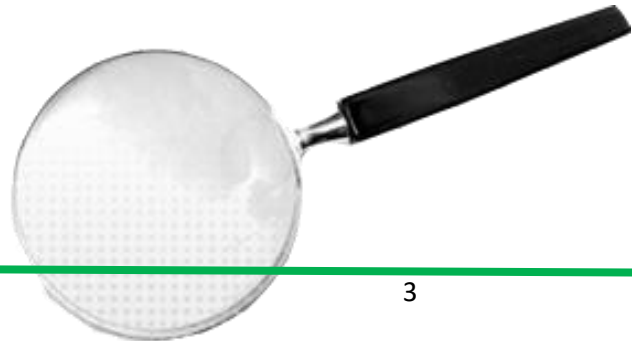
```
eslam@ITI:~$ ls -li test5
9574885 -rw-rw-r-- 1 eslam eslam 91056 Jun 12 12:58 test5
eslam@ITI:~$ zip test5.zip test5
updating: test5 (deflated 95%)
eslam@ITI:~$ ls -li test5.zip
9602708 -rw-rw-r-- 1 eslam eslam 4775 Jun 12 13:03 test5.zip
eslam@ITI:~$ unzip test5.zip
Archive:  test5.zip
replace test5? [y]es, [n]o, [A]ll, [N]one, [r]ename: y
  inflating: test5
eslam@ITI:~$ ls -li test5
9574885 -rw-rw-r-- 1 eslam eslam 91056 Jun 12 12:58 test5
eslam@ITI:~$
```

differences between compress and gzip commands? `gzip` generally
achieves better compression ratios than `compress`, meaning it can
reduce file sizes more effectively

3. What is the command used to view the content of a compressed file.
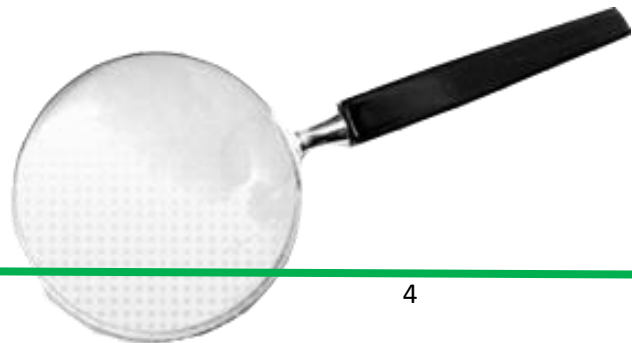
    zcat

4. Backup /etc directory using tar utility.
```

```
tar: Exiting with failure status due to previous e
eslam@ITI:~$ tar -cvf etc.tar /etc
```

5. Starting from your home directory, find all files that were modified in the last two day.

```
eslam@ITI:~$ find ~ -type f -mtime -2
```

6. Starting from /etc, find files owned by root user.

```
eslam@ITI:~$ sudo find /etc -user root
[sudo] password for eslam:
/etc
/etc/fuse.conf
/etc/cloud
/etc/cloud/clean.d
/etc/cloud/clean.d/99-installer-use-networkmanager
/etc/cloud/clean.d/99-installer
/etc/cloud/cloud.cfg.d
/etc/cloud/cloud.cfg.d/90_dpkg.cfg
/etc/cloud/cloud.cfg.d/README
```

7. Find all directories in your home directory.

```
eslam@ITI:~$ find ~ -type d
```

8. Write a command to search for all files on the system that, its name is ".profile".

```
eslam@ITI:~$ locate .profile
/etc/skel/.profile
/home/eslam/.profile
/snap/core/16928/etc/skel/.profile
/snap/core/16928/usr/share/base-files/dot.profile
/snap/core/16928/usr/share/base-files/dot.profile.md5sums
/snap/core18/2823/etc/skel/.profile
/snap/core18/2823/usr/share/base-files/dot.profile
/snap/core18/2823/usr/share/base-files/dot.profile.md5sums
/snap/core22/1380/etc/skel/.profile
/snap/core22/1380/usr/share/base-files/dot.profile
/snap/core22/1380/usr/share/base-files/dot.profile.md5sums
/snap/core22/1380/usr/share/lintian/profiles/dpkg/main.profile
/snap/core22/1380/usr/share/opensc/asepcos.profile
/snap/core22/1380/usr/share/opensc/authentic.profile
/snap/core22/1380/usr/share/opensc/cardos.profile
/snap/core22/1380/usr/share/opensc/cyberflex.profile
/snap/core22/1380/usr/share/opensc/entersafe.profile
```

ubuntu

9. Identify the file types of the following: /etc/passwd, /dev/pts/0, /etc, /dev/sda.

```
eslam@ITI:~$ ls -ld /etc/passwd
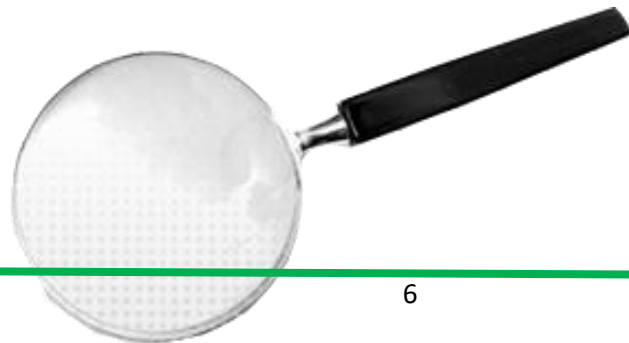-rw-r--r-- 1 root root 3000 Jun  9 13:52 /etc/passwd
```

/etc/passwd: flle   -

```
eslam@ITI:~$ ls -l /dev/pts/0
crw--w---- 1 eslam tty 136, 0 Jun 12 13:24 /dev/pts/0
```

/dev/pts/0: character special file   c

```
eslam@ITI:~$ ls -l /dev/sda
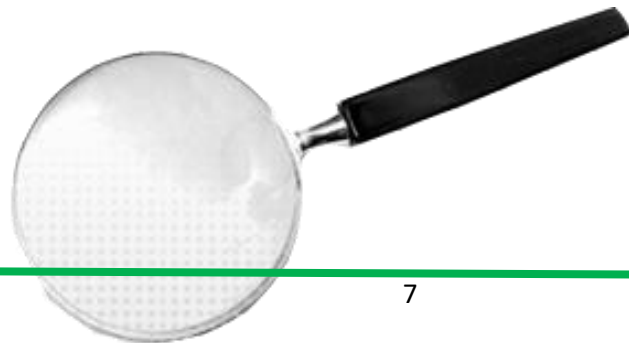brw-rw---- 1 root disk 8, 0 Jun  9 12:50 /dev/sda
```

/dev/sda: Block special file   b

ubuntu

10. List the inode numbers of /, /etc, /etc/hosts.

```
eslam@ITI:~$ ls -i /
      12 bin                 4718593 opt
 9043969 bin.usr-is-merged         1 proc
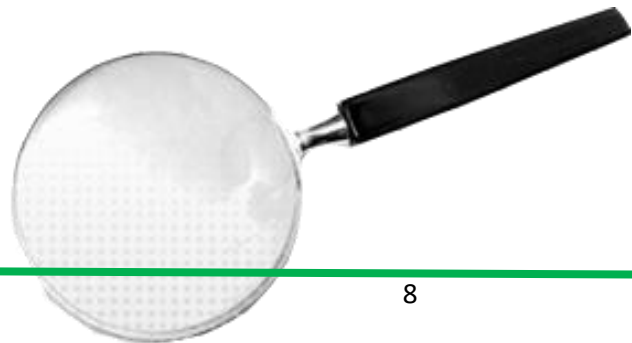 1572865 boot                 393217 root
```

```
eslam@ITI:~$ ls -i /etc
3015025 adduser.conf       3015067 lsb-release
3014670 alsa               3015068 machine-id
3014671 alternatives       3015069 magic
3015026 anacrontab         3015070 magic.mime
3015027 apg.conf           3015071 manpath.config
3014672 apm                3015072 mime.types
3014674 apparmor           3015073 mke2fs.conf
3014673 apparmor.d         3014665 ModemManager
```

```
eslam@ITI:~$ ls -i /etc/hosts
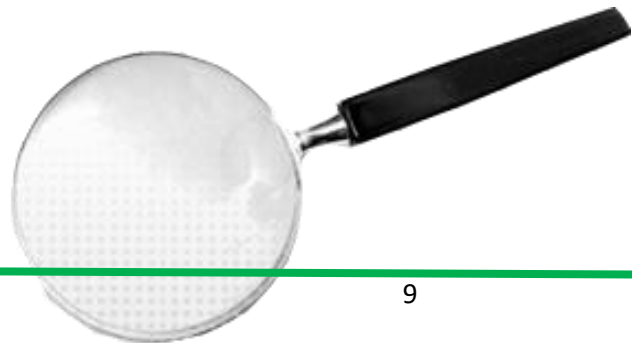3015049 /etc/hosts
```

11. Copy /etc/passwd to your home directory, use the commands diff and cmp, and Edit in the file you copied, and then use these commands again, and check the output.

```
eslam@ITI:~$ ls -i /etc/hosts
3015049 /etc/hosts
eslam@ITI:~$ cp /etc/passwd /home/eslam
eslam@ITI:~$ diff /etc/passwd /home/eslam/passwd
11a12
> hi in ITI
eslam@ITI:~$ cmp /etc/passwd /home/eslam/passwd
/etc/passwd /home/eslam/passwd differ: byte 477, line 12
eslam@ITI:~$
```

ubuntu

12. Create a symbolic link of /etc/passwd in /boot.

```
eslam@ITI:~$ sudo ln -s /etc/passwd /boot
[sudo] password for eslam:
eslam@ITI:~$ ls /boot
config-6.8.0-31-generic        memtest86+x64.bin
config-6.8.0-35-generic        memtest86+x64.efi
efi                            passwd
grub                           System.map-6.8.0-31-generic
initrd.img                     System.map-6.8.0-35-generic
initrd.img-6.8.0-31-generic    vmlinuz
initrd.img-6.8.0-35-generic    vmlinuz-6.8.0-31-generic
initrd.img.old                 vmlinuz-6.8.0-35-generic
memtest86+ia32.bin             vmlinuz.old
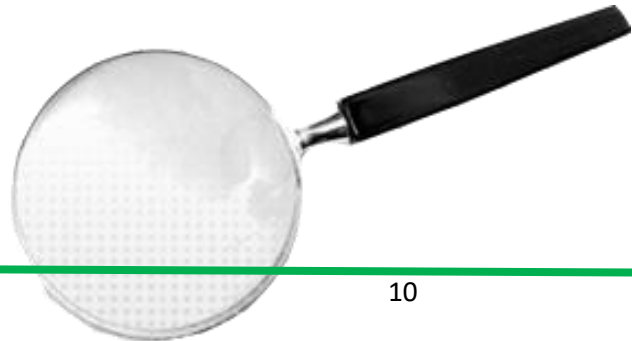memtest86+ia32.efi
eslam@ITI:~$
```

13. Create a hard link of /etc/passwd in /boot. Could you? Why?

```
eslam@ITI:~$ ln /etc/passwd /boot
ln: failed to create hard link '/boot/passwd' => '/etc/passwd': Operation not permi
tted
```

-no, because hard link should be in same partition of original file

14. List the user commands that have set-uid permissions in the system.

```
eslam@ITI:~$ find /usr/bin -type f -perm -4000
/usr/bin/fusermount3
/usr/bin/sudo
/usr/bin/newgrp
/usr/bin/mount
/usr/bin/chfn
/usr/bin/passwd
/usr/bin/pkexec
/usr/bin/chsh
/usr/bin/su
/usr/bin/gpasswd
/usr/bin/umount
```

15. List the user commands that have set-gid permissions in the system.

```
eslam@ITI:~$ find /usr/bin -type f -perm -2000
/usr/bin/ssh-agent
/usr/bin/crontab
/usr/bin/plocate
/usr/bin/chage
/usr/bin/expiry
eslam@ITI:~$
```

16. List the directories that have sticky-bit set in the system.

```
eslam@ITI:~$ find /usr/bin -type f -perm -1000
```