Intermediate

1)

```
roy@roy-virtual-machine:~$ ls -m
Desktop, doc1.txt, Documents, Downloads, f1, Music, myfile, Pictures, Public, snap, Templates, Videos
```

The command should be ls -m

2)

```
mkdir test
cd test
cp /etc/fstab .
ls
ls -l
touch foo ./-l
ls
ls -l
```

Command mkdir test	make a directory named “test”.
Command cd test	enter the directory called “test”.
Command cp /etc/fstab .	copy the file ‘fstab’ in /etc directory to the current directory.
Command ls	list all the directory contents.
Command ls -l	long list all the directory contents in detail.
Command touch foo ./-l	create two empty files named “foo” and “-l”. Using “./” to state “-l” is not an option.
Command ls	list all the directory contents.
Command ls -l	long list all the directory contents in detail.

```
roy@roy-virtual-machine:~/test$ touch foo ./-l
roy@roy-virtual-machine:~/test$ ls
foo  fstab  -l
roy@roy-virtual-machine:~/test$ ls -l
total 4
-rw-rw-r-- 1 roy roy   0 9月  23 21:01 foo
-rw-rw-r-- 1 roy roy 665 9月  23 21:01 fstab
-rw-rw-r-- 1 roy roy   0 9月  23 21:01 -l
roy@roy-virtual-machine:~/test$ ls *
-rw-rw-r-- 1 roy roy   0 9月  23 21:01 foo
-rw-rw-r-- 1 roy roy 665 9月  23 21:01 fstab
```

Problem: after execute ls *, the file “-l” is not on the list.

Explain: the option * will print all the matched file on the screen. While, the file “-l” starts with the character “-”, which does not match the pattern in “*”. Thus, it omits this file in “ls -l” command output.

```
roy@roy-virtual-machine:~/test$ rm *
rm: invalid option -- 'l'
Try 'rm ./-l' to remove the file '-l'.
Try 'rm --help' for more information.
```

Problem: It cannot remove the file "-l" in the directory.
Explain: the option * will print all the matched file on the screen. While, the file "-l" starts with the character "-", which does not match the pattern in "*". Thus, it omits this file in "ls -l" command output.

Modified command: rm ./-l && rm *

```
roy@roy-virtual-machine:~/test$ rm ./-l && rm *
roy@roy-virtual-machine:~/test$ ls
roy@roy-virtual-machine:~/test$
```

Explain: First remove "-l", by specified it using "./". And then remove the rest two file files.

3)
Result:

```
roy@roy-virtual-machine:~/test$ cat /etc/fstab > /dev/tty
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=14e825a2-154b-4711-8c07-464a1e25c3e8 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda1 during installation
UUID=9ABA-B969  /boot/efi       vfat    umask=0077      0       1
/swapfile                                 none            swap    sw              0       0
```

Explain: The result display on the standard output (terminal) instead of rewriting in the file "/dev/tty". Normally, if the place of output is a file, then the redirection will work, and there would not nothing on the terminal. However, the redirection had been truncated since "/dev/tty" is not a file. Thus, the output has to being shown on the standard place (terminal). In this case, the real core is that the redirection fails.

4)

```
roy@roy-virtual-machine:~/test$ ls
roy@roy-virtual-machine:~/test$ ln -s foo foo
roy@roy-virtual-machine:~/test$ cat foo
cat: foo: Too many levels of symbolic links
roy@roy-virtual-machine:~/test$
```

Explain: In this case, we create s soft link "foo" (in fact, an image file) in the directory "test". However, In such directory, there is no file named "foo", so when I "cat" soft link "foo", it does not know where to link.

5)

```
roy@roy-virtual-machine:/run$ find -type f 2> /dev/null
```

The command that can only find files in the /run directory is: find -type f 2> /dev/null

Here is the result:

```
roy@roy-virtual-machine:/run$ find -type f 2> /dev/null
./motd.d/fwupd/85-fwupd
./snapd/ns/snap-store.mnt
./snapd/ns/snap.snap-store.info
./snapd/ns/snap.snap-store.fstab
./snapd/lock/snap-store.lock
./snapd/lock/.lock
./acpid.pid
./gdm3.pid
./crond.reboot
./crond.pid
./cups/printcap
./avahi-daemon/pid
./utmp
./user/1000/update-notifier.pid
./user/1000/ICEauthority
./user/1000/gdm/Xauthority
./user/1000/dconf/user
./user/1000/pulse/pid
./user/1000/systemd/transient/vte-spawn-7be3028a-6bd5-47e7-86c3-b04ffb580248.scope
./user/1000/systemd/transient/snap.snap-store.ubuntu-software.68baece0-207a-46a8-9216-f273c2b5a959.scope
./fsck/sda.lock
./console-setup/boot_completed
./console-setup/font-loaded
./vmblock-fuse/dev
./tmpfiles.d/static-nodes.conf
./mount/utab
./mount/utab.lock
./NetworkManager/resolv.conf
./NetworkManager/no-stub-resolv.conf
./NetworkManager/system-connections/有线连接 1.nmconnection
./NetworkManager/devices/2
./NetworkManager/conf.d/10-globally-managed-devices.conf
./systemd/transient/session-2.scope
./systemd/inhibit/33
./systemd/inhibit/12
./systemd/inhibit/11
./systemd/inhibit/10
./systemd/inhibit/4
./systemd/inhibit/3
./systemd/inhibit/2
./systemd/inhibit/1
./systemd/timesync/synchronized
./systemd/resolve/stub-resolv.conf
./systemd/resolve/resolv.conf
```

```
./udev/tags/systemd/c4:81
./udev/tags/systemd/c4:82
./udev/tags/systemd/c4:83
./udev/tags/systemd/c4:80
./udev/tags/systemd/c4:79
./udev/tags/systemd/c4:78
./udev/tags/systemd/c4:77
./udev/tags/systemd/c4:74
./udev/tags/systemd/c4:65
./udev/tags/systemd/c4:75
./udev/tags/systemd/c4:76
./udev/tags/systemd/n2
./udev/tags/systemd/b8:0
./udev/tags/systemd/b7:5
./udev/tags/systemd/b7:2
./udev/tags/systemd/b7:3
./udev/tags/systemd/b7:4
./udev/tags/systemd/b7:1
./udev/tags/systemd/b7:0
./udev/tags/systemd/+module:fuse
./udev/tags/systemd/+module:configfs
./udev/tags/seat/+sound:card0
./udev/tags/seat/+drm:card0-Virtual-8
./udev/tags/seat/+leds:input1::scrolllock
./udev/tags/seat/+leds:input1::capslock
./udev/tags/seat/+drm:card0-Virtual-7
./udev/tags/seat/+leds:input1::numlock
./udev/tags/seat/+drm:card0-Virtual-6
./udev/tags/seat/c10:242
./udev/tags/seat/b11:0
./udev/tags/seat/+drm:card0-Virtual-5
./udev/tags/seat/+drm:card0-Virtual-4
./udev/tags/seat/c21:0
./udev/tags/seat/+drm:card0-Virtual-3
./udev/tags/seat/+drm:card0-Virtual-2
./udev/tags/seat/+drm:card0-Virtual-1
./udev/tags/seat/c29:0
./udev/tags/seat/c226:0
./udev/tags/seat/c226:128
./udev/tags/seat/+input:input5
./udev/tags/seat/c189:130
./udev/tags/seat/c189:128
./udev/tags/seat/+input:input3
./udev/tags/seat/+input:input4
./udev/tags/seat/+input:input1
./udev/tags/seat/c189:0
./udev/tags/seat/+input:input0
roy@roy-virtual-machine:/run$
```

6)

```
roy@roy-virtual-machine:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:2d:89:dc brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.88.128/24 brd 192.168.88.255 scope global dynamic noprefixroute ens33
       valid_lft 1741sec preferred_lft 1741sec
    inet6 fe80::6f45:ec7b:6e29:4d86/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

Use ip. Command “ip a” gives all the network interfaces. Here are two interfaces, and the first one is the loopback interface which is a virtual interface. The second one is what I want. The name is “ens33”. The MAC address is “192.168.88.128”

```
roy@roy-virtual-machine:~$ netstat -ie
Kernel Interface table
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.88.128  netmask 255.255.255.0  broadcast 192.168.88.255
        inet6 fe80::6f45:ec7b:6e29:4d86  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:2d:89:dc  txqueuelen 1000  (Ethernet)
        RX packets 7595  bytes 5195695 (5.1 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2547  bytes 202800 (202.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 423  bytes 37191 (37.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 423  bytes 37191 (37.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Use netstat. Command “netstat ie” can check network interfaces in the system. It result is similar to the above.

7)

```
roy@roy-virtual-machine:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.88.128  netmask 255.255.255.0  broadcast 192.168.88.255
        inet6 fe80::6f45:ec7b:6e29:4d86  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:2d:89:dc  txqueuelen 1000  (Ethernet)
        RX packets 7661  bytes 5201463 (5.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2551  bytes 203139 (203.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 427  bytes 37559 (37.5 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 427  bytes 37559 (37.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Here is the IP address and netmask for my own Ubuntu machine. It is similar to the above two commands. The IP address is “192.168.88.128”. The netmask is “255.255.255.0”

```
roy@roy-virtual-machine:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 ens33
link-local      0.0.0.0         255.255.0.0     U         0 0          0 ens33
192.168.88.0    0.0.0.0         255.255.255.0   U         0 0          0 ens33
```

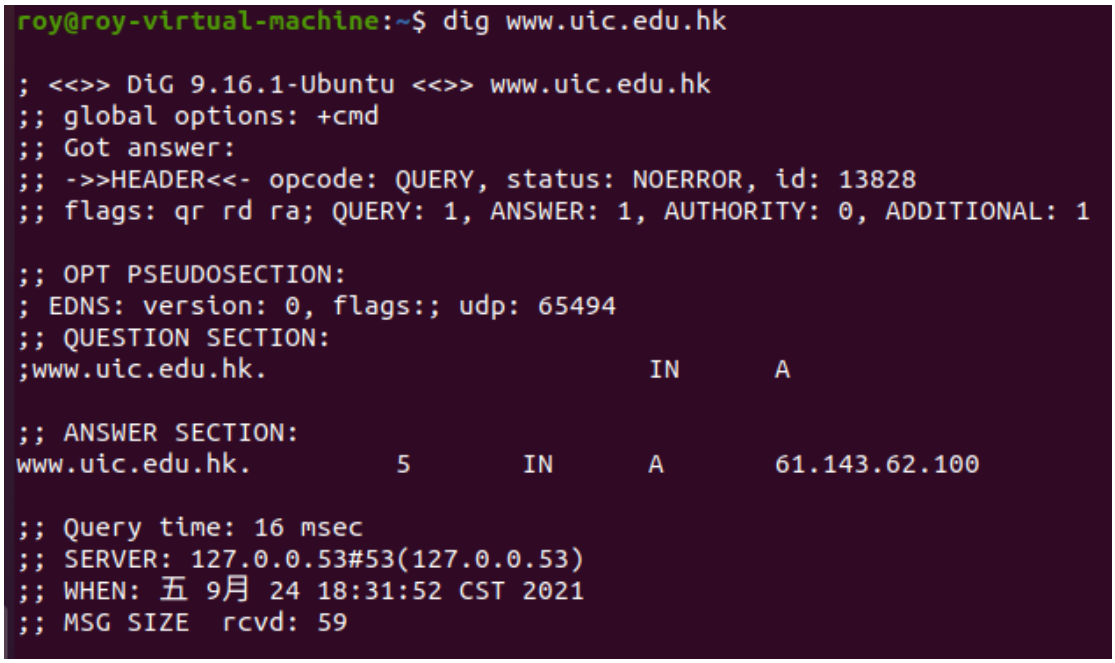
Here is the IP address for the machine router. Command “netstat -r” can show the kernel network router table. The IP address is “192.168.88.0”.

```
roy@roy-virtual-machine:~$ cat /etc/resolv.conf
# This file is managed by man:systemd-resolved(8). Do not edit.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs must not access this file directly, but only through the
# symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a different way,
# replace this symlink by a static file or a different symlink.
#
# See man:systemd-resolved.service(8) for details about the supported modes of
# operation for /etc/resolv.conf.

nameserver 127.0.0.53
options edns0 trust-ad
search localdomain
```

Here is the IP address for the DNS server. In Linux, IP address of DNS server is stored in “/etc/resolv.conf”. Thus, we can open and search this file by command “cat”. The IP address is “127.0.0.53”.

8)



Command: “dig www.uic.edu.hk”. The command dig performs DNS searching. It provides information about the server by giving the domain name. The IP address “61.143.62.100” is shown on the screenshot.