***Question 1***

***a)***

dhcp is used to automatically assign ip addresses to any devices on a network. There are 4 stages/message types in a typical transaction, they are Discovery, offer, request, and acknowledgement.

Discovery is when a client asks a dhcp server to start a dhcp transaction so that it can receive an ip address. Next an offer is made by the dhcp server to the client by giving it an ip address. The client now asks to use the offered ip address by sending the request. Finally, the server send s an acknowledgement that that ip has been given to it.

***b)***

the three methods of dhcp ip allocation are dynamic, automatic, and manual.

Dynamic is very simple and straight forward, Ip addresses are assigned from a range which has already been specified.

Automatic is like dynamic but it also tries to give the same address for each device, i.e., if a device connects then disconnects, the server will try to give it the same Ip that it had last time if it is still in range

***c)***

there is a lot of info that is provided to the client, this includes the

1. server ip address,
2. gateway ip address,
3. mac address also known as client hardware address,
4. server name,
5. as well as your ip address which is offered from the server.

All this info is available to the client and more

***Question 2***

***a)***

authoritative dns servers can hold and the proper mapping of records and respond to the recursive servers with important info like a ip address and dns records for each website it holds.

non authoritative servers and responses do not hold the original zone files.

***b)***

The client will end a dns request to the recursive dns resolver. This will act as a middle man between the client and dns nameserver. If the recursive server already has a cached response(which may occur because a website may be popular or recently accessed), or it send s a request to root nameserver, then a to a tld server, and then finally to an authoritative nameserver from which it will receive an ip address. Then is sends this ip address back to the client as a response. Throughout this process the recursive server will cache the info from the authoritative nameserver to be used next time for a quicker response.

The client can now access example.com with the ip it has received

***c)***

Dns Resolver : a layer 2 or 3 switch that sends and receives queries to and from the dns server on behalf of the client.

Dns zone : is a specific portion of the dns namespace in dns, which is managed by a specific organization or admin, i.e. its an administrative space that allows for more granular control of components like authoritative nameservers

Zone file: databases that are used by the dns servers which hold resource records rr.

Dns record: live in zone files and contain things like the A record for website. For example, an A record of google.com would be 8.8.8.8 which is stored in the A record.

AAAA record: like A record in that they hold records for websites howeverthe format they have them is ipv6 rather than ipv4.

***Question 3***

***a)***

Mounting a filesystem attaches that files system to a directory(mount point) and makes it available to the system.

***b)***

it allows computers to share files over a network. This makes it so that data can be stored in one place but can be accessed from all other devices on the network if you want.

***c)***

1. Install an NFS server daemon.
2. Give it permissions it needs, this includes firewall.
3. Use the exportfs command to tell the server to share directories.
4. Finally, the client installs a client program and connects to the server using the mount command to mount the share to their ow filesystem.

***d)***

root squashing basically gives the client the least number of privileges available on the server, therefore if something is not world read, then the client will not be able to access them.

Consequence would be that the client would have more privileges on the server which is a very high security risk.

***Question 4***

***a)***

By using culture automation, measurement and sharing devops aims to shorten the systems development life cycle and deliver high quality results. It is compatible with the agile software development.

***b)***

A group is a collection of users who share the same rights. Users can be added and removed. Any privileges that are given to are a group are therefore given to all the users that are part of that group.

Users that aren’t added toa group when they are created go to their own primary group which is personal to that user only when created.

Secondary groups are those which users are added to after they are created.

***c)***

1. config files
2. important daemons and servers
3. mount points for devices
4. bootloaders and kernels for the system
5. home directories for users

***d)***

1. used to change the location
2. used to read/concatenate files
3. used to display files in a read only format
4. used to search for a pattern
5. copy files or directories

***Question 5***

***a)***

Make an Apache server

1. Install Apache sudo apt install apache2
2. Run the service systemctl status apache2
3. Open port 80 for tcp connections sudo ufw allow 80/tcp
4. You can create pages/folders in /var/www/
5. Make a web user and give them full ownership over /var/www.

***b)***

The router for the Apache server must enable port forwarding to the server so that all requests to the router are redirected to the server. Also getting a domain would be the best course of action for the public to use it easily. Domains can be bought and made to point to a ip very simply online.

***c)***

the company would no longer have web access as the response traffic that is trying to be returned to the rest of the company would be forwarded to the web server.

***d)***

to solve this issue Ip masquerading can be used. One system will act as a gateway for the entire network, so that all packets get their source ip changed with the ip of the gateway and then it can proceed to the internet