Question 1

Exemplify two data structures that you know and describe some situations where you would use them.

Lists are the most common data structure because in almost all applications we need to store multiple items. They can also be used to implement Stacks or Queues.

Dictionaries are another useful data structure that stores data in key-value pairs and the keys are unique. I would use dictionaries where I would need fast access to some data.

Question 2

You open a web browser and access http://www.tss-yonder.com. What is the IP address behind this website and how does the browser know how to get the correct IP?

It asks the DNS to which IP address does this domain correspond, and it returns the IP address.

Question 3

Exemplify two transport protocols and think of two applications that would use each of them.

TCP (Transmission Control Protocol) is used when we want a reliable connection.

UDP (User Datagram Protocol) is used when we want a fast delivery of packets, low latency or realtime data.

One app that could use each of them could be a chat app where messages are sent using TCP and voice/video calls use UDP.

Another app that could use each could be an online game where UDP would be used during the gameplay/in the match and TCP would be used for the rest of the time eg. during authentication, in menus, during matchmaking.

Question 4

You wrote a chat web application in your favorite programming language. You need to host this somewhere and run it so that the entire world can start using it. Describe how you would do that and the tools you would use.

I would host it in a container on a cloud platform like AWS so I can easily scale it later. I would need to get a domain and set up DNS then configure web server software like Nginx, setup monitoring and logging and then implement CI/CD pipelines to automate the deployment.

Question 5

Now your application is famous but unfortunately it has a lot of bugs. You want only you and a couple of your friends to be able to access it until you patch it. Describe two ways you can achieve this.

We can use IP whitelisting to only allow access for our IPs or have roles set up for users and give ourselves a special role and block access for the other roles.

Question 6

Your application is ready for the public once again. You realize that you forgot about security and any network administrator can see the messages that a user sends or receives. How would you improve your application to prevent this? Is

there any way to do this so that not even the application owner (you) can see the messages between two random users?

I would implement end to end encryption and not even I would be able to see messages between 2 users.

Question 7

What are cookies and what are they used for? Find a cookie used by http://www.tss-yonder.com and copy its name and value. What do you think is its purpose?

Cookies are key-value pairs used on the client side to store data relevant to the user session such as tokens, user id and other data relevant to the session.

PHPSESSID: 8tlb64lp0rrd4hnrpjdh215l75

Its purpose is to keep the current session id.

Question 8

While writing your application you need to create more worker processes for processing some data. How can you create child processes in your favorite language? What are the possible states of a process?

```c
int procNo = atoi(argv[1]);

for (i = 0; i < procNo; i++) {

    pid = fork();

    if (pid < 0) {
        printf("Error");
        exit(-1);
    }

    if (pid == 0) { //child
        do_work(i, procNo);
        exit(0);
    }
}

for (i = 0; i < N; i++)
    wait(NULL);
```

Here is an example in c that take a number from the program arguments and create that many processes then waits for them to finish.

Processes can be in the following states:

- Running
- Blocked
- Ready
- Terminated

Question 9

Your application is running but it still has a few problems. Occasionally, it returns an error page. How can you find the PID of your application? What would you do to debug it?

To find the PID we can use terminal commands such as **pgrep “Appname”** or using the task manager.

To debug it I would check the logs while trying to reproduce the problem.

Question 10

What DBMS would you use to store your application data and why? How would you store the passwords of each user?

I would use PostgreSQL and store the passwords in the database using Bcrypt which applies a hash function to the password.

Python App

1. First i created a docker compose file.

```
services:
  backend:
    image: "yondermakers/yonder-devops-tech-assessment:latest"
    ports:
        - "30000:8080"
```

   Then i brought the container up using

   docker compose -f "compose.yml" up -d --build

2. Then i accessed **localhost:30000** in the browser to get the questions page
3. I created a project in PyCharm with a virtual environment

4. I created a class that represents the driver license

```python
class Permis:
    def __init__(self, id, nume, prenume, categorie, dataDeEmitere, dataDeExpirare, suspendat):
        self.id = id
        self.nume = nume
        self.prenume = prenume
        self.categorie = categorie
        self.dataDeEmitere = dataDeEmitere
        self.dataDeExpirare = dataDeExpirare
        self.suspendat = suspendat

    def __repr__(self):
        return "{0},{1},{2},{3},{4},{5},{6}".format(self.id, self.nume, self.prenume, self.categorie,
                                                    self.dataDeEmitere, self.dataDeExpirare, self.suspendat)

    def __iter__(self):
        return iter(
            [self.id, self.nume, self.prenume, self.categorie, self.dataDeEmitere, self.dataDeExpirare, self.suspendat])
```

5. Then I created a function to get data from the api and 3 other functions to filter the data according to the pdf and then I created a function that saves each list of filtered licenses to a .csv that can be opened in Excel.