MHA Developer Test

Question 1

At MHA the IT team enjoys taking part in the advent of code every year, it is an annual set of Christm
programming challenges that follow the advent calendar.

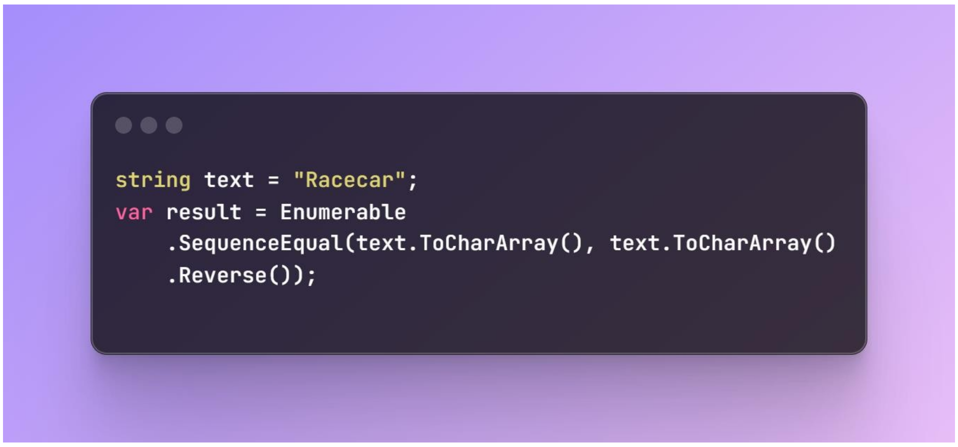
Show us your skills by completing as many days as you can, validating the code works by providing y
advent of code, then send us a link to your repo including a screenshot of your advent of code compl
this test.

https://adventofcode.com/

Question 2

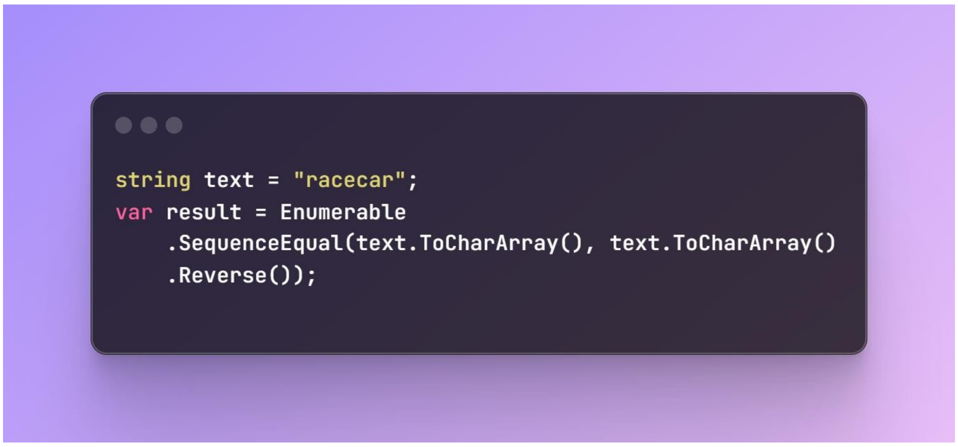
Consider the below code snippets:

1.



```
string text = "Racecar";
var result = Enumerable
    .SequenceEqual(text.ToCharArray(), text.ToCharArray()
    .Reverse());
```

2.



```
string text = "racecar";
var result = Enumerable
    .SequenceEqual(text.ToCharArray(), text.ToCharArray()
    .Reverse());
```

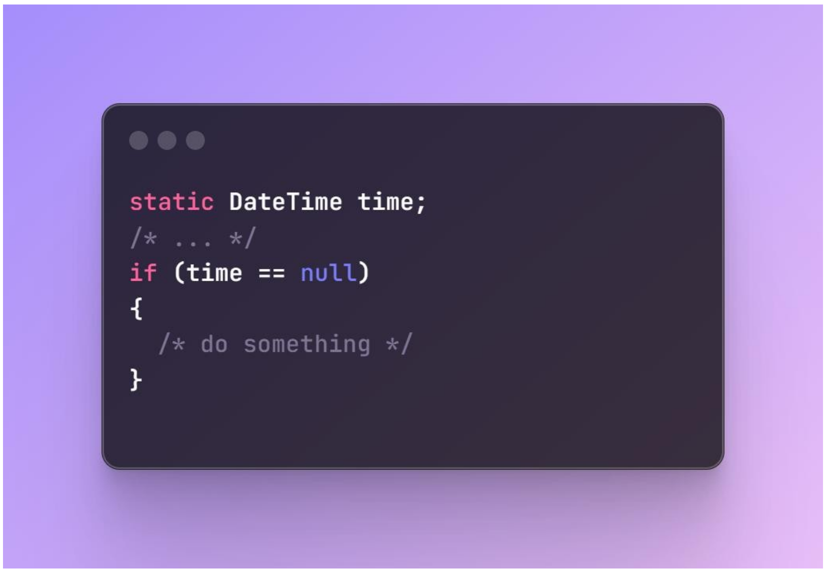
What is the purpose of these snippets?

The code snippets check if the value "text" is a palindrome.

Will both snippets return “true”? Why / Why not?

No, The first one will return false because of the capital letter R.

Consider the below code snippet:



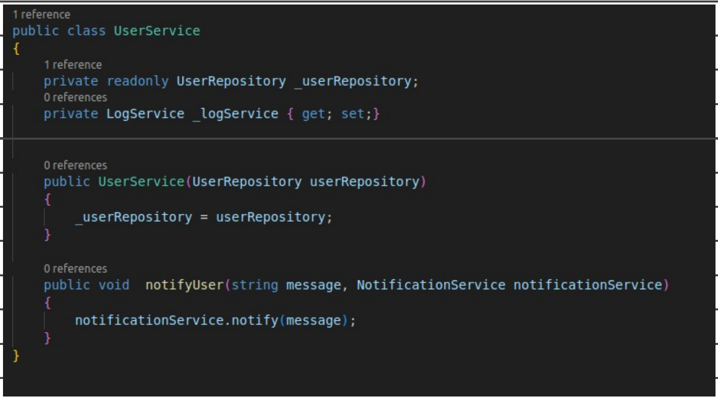
```
static DateTime time;
/* ... */
if (time == null)
{
  /* do something */
}
```

Is the comparison of time and null in the if statement below valid or not? Why or why not?

No, because the time variable will never be equal to null since DateTime cannot be null(its a value type)

Explain the concept of dependency injection in C# using code examples for constructor injection, property injection and method injection.

Dependency Injection is a design principle where a class is given an abstracted view of a dependency it needs. Instead all it cares about is using the dependency and the initialization is handled by the framework. It helps keep code more easily mantainable, readable and testable.

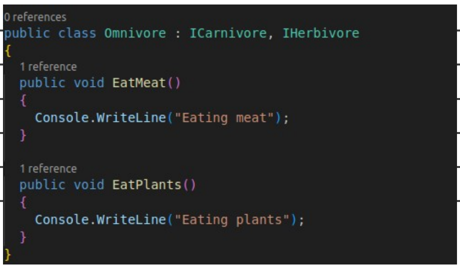


```
1 reference
public class UserService
{
    1 reference
    private readonly UserRepository _userRepository;
    0 references
    private LogService _logService { get; set;}


    0 references
    public UserService(UserRepository userRepository)
    {
        _userRepository = userRepository;
    }

    0 references
    public void  notifyUser(string message, NotificationService notificationService)
    {
        notificationService.notify(message);
    }
}
```

In the example above useRepository is injected using constructor injection, logService uses field and notificationService uses method injection.

How does C# manage multiple inheritances for classes, and what is the alternative mec achieving similar functionality? Show us through a code example

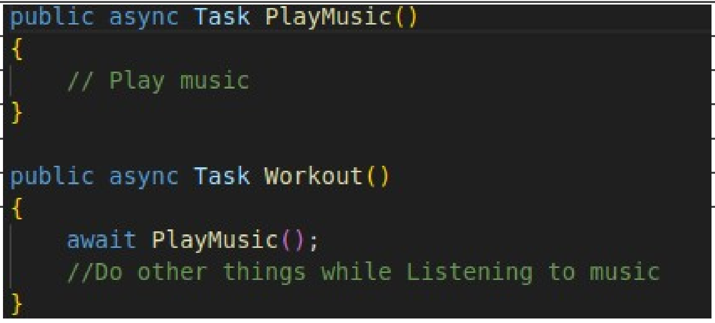
C# does not support multiple inheritences, to avoid the diamond problem, but it can be achieved by using interfaces, as seen below:



```
0 references
public class Omnivore : ICarnivore, IHerbivore
{
    1 reference
    public void EatMeat()
    {
        Console.WriteLine("Eating meat");
    }

    1 reference
    public void EatPlants()
    {
        Console.WriteLine("Eating plants");
    }
}
```

Describe and show a code example of how asynchronous programming is used in C#

Asynchronous programming allows us to optimize excectution time of applications by running some operations, where possible, in parallel threads. In c# we can use the aync await keywords to achieve this. E.g:



```
public async Task PlayMusic()
{
    // Play music
}

public async Task Workout()
{
    await PlayMusic();
    //Do other things while Listening to music
}
```

Question 3

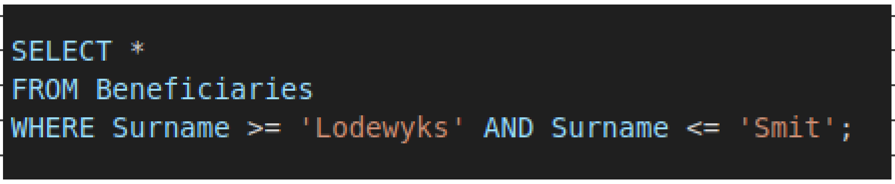
A windowless room contains three identical light fixtures, each containing an identical light bulb or light globe. Each light is connected to one of three switches outside of the room. Each bulb is switched off at present. You are outside the room, and the door is closed. Before opening the door you may play around with the light switches as many times as you like. But once you've opened the door, you may no longer touch a switch. After this, you go into the room and examine the lights. How can you tell which switch goes to which light?

The state of a light bulb being on or off can let me pick out 2 of the light bulbs. So my solution, assuming I've got a good amount of time before going inside the room, would be two switch one of the light bulbs on for an extended period so I can use the heat from that bulb as my third signal.

Question 4

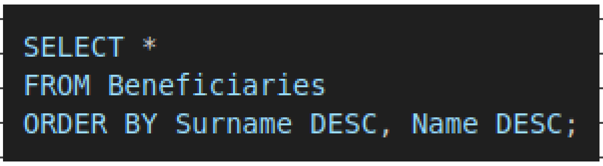
Please compose a SQL query to accomplish the specified outcome in each of the followi
scenarios.

Select “Beneficiaries” where the “Surname” is alphabetically between (and including) “Lodewyks” and “Smit”



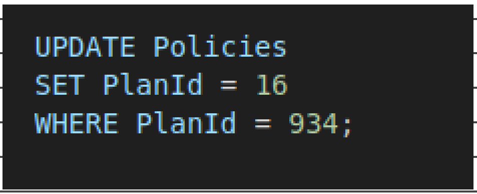
```
SELECT *
FROM Beneficiaries
WHERE Surname >= 'Lodewyks' AND Surname <= 'Smit';
```

Select “Beneficiaries” sorted descending by “Surname” then “Name”



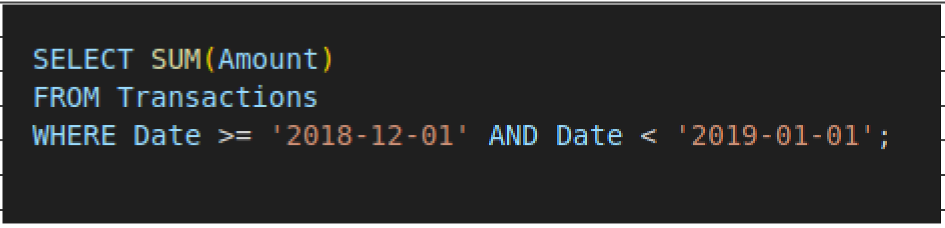
```
SELECT *
FROM Beneficiaries
ORDER BY Surname DESC, Name DESC;
```

Change all “Policies” where the “PlanId” is 934 to “PlanId” 16



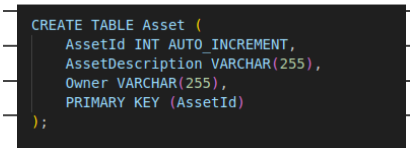
```
UPDATE Policies
SET PlanId = 16
WHERE PlanId = 934;
```

Get the sum (“Amount”) of all “Transactions” made in December 2018



```
SELECT SUM(Amount)
FROM Transactions
WHERE Date >= '2018-12-01' AND Date < '2019-01-01';
```

Create a new table with the name “Asset” containing an auto incremented unique identifier (“AssetId”), a description of the asset (“AssetDescription”) and the owner (“Owner”).



```
CREATE TABLE Asset (
    AssetId INT AUTO_INCREMENT,
    AssetDescription VARCHAR(255),
    Owner VARCHAR(255),
    PRIMARY KEY (AssetId)
);
```

Question 5

Explain the difference between the below HTTP verbs in the instance of REST API

GET

Simply retrieves a resource

POST

Creates a new resource which can be sent as a request object

DELETE

Deletes the specified resource

PUT

Updates an existing resource by replacing the current one with the one sent to the api