Part01

Q1. What is the difference between int.Parse and Convert.ToInt32 when handling null inputs?

Int.Parse(null) = throws ArgumentNullException

Convert.ToInt32(null) = 0

Q2. Why is TryParse recommended over Parse in user-facing applications?

TryParse is handling bad arguments by returning 0 then complete the remaining program unlike the Parse which in this case throw an exception and the program will be crashed

Q3. Explain the real purpose of the GetHashCode() method.

It's a number to check if two objects points on the same reference or not (in case of referenced types)

If valued types it returns a value that represents its hash code in the stack

Q4. What is the significance of reference equality in .NET?

When we put obj1 = obj2 that means the references of them will equal to other not only their values

Q5. Why string is immutable in C#?

It's the most efficient in case reading, no much modifications.

No a lot of modifications = No a lot of unreached objects

Q6. How does StringBuilder address the inefficiencies of string concatenation?

String builder uses linked list (dynamic) so each char points to the other. This allows us to insert/remove into a specific position or appending with less space complexity. In addition to being mutable so editing any SB this means we will edit the same object and won't create a new obj

Unlike strings that are static (arrays of chars) then any operation will force us to create a new modified object (or destroy the old one then create a new one [GC do this after the memory has been filled])

Q7. Why is StringBuilder faster for large-scale string modifications?

Because of using linked lists in SB not just static arrays. This ease modifications to prevent memory wasting.

Q8. Which string formatting method is most used and why?

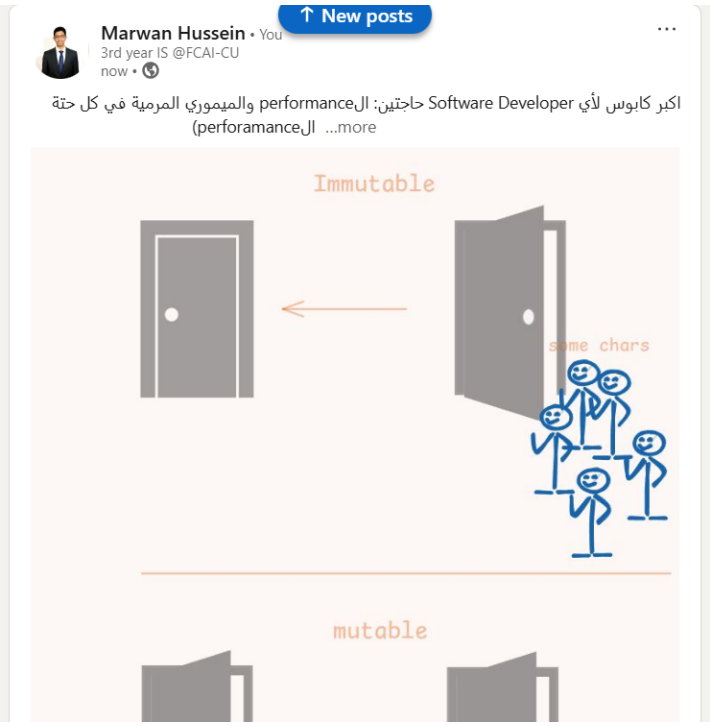
String Interpolation (using $) -> it's more readable and using less memory and we can use math and logic in it.

Q9. Explain how StringBuilder is designed to handle frequent modifications compared to strings.

	SB	String
type	Dynamic	Static
immutable	false	true
initially uses	Linked list	Arrays
best for	a lot of modification	read only data
shortcomings	high complexity (compared with strings)	memory wasting if we used it in a lot of modifications

Part02

1- LinkedIn article about string immutability (https://www.linkedin.com/posts/marwan-hussein-568373314_dotnet-softwareengineering-performance-activity-7422776756459368448-nSuZ?utm_source=share&utm_medium=member_desktop&rcm=ACoAAE_JsmABvTFVwhoN_Ti9LOJQCQO2JKvt0pM)



2- What's Enum data type, when is it used? And name three common built_in enums used frequently?

Enum = Enumeration: distinct value type -> allows us to create a set of named constants

When it used:

* using some magic keywords (instead of numbers) based on numbers like Red Black Tree (Enum elements are Red =0, Black=1)

* to make the code readable

Examples:

* ConsoleColor: to change text or background of the terminal like values (Red, Green, Blue,..)

* HttpStatusCode: (OK = 200, NotFound = 404, InternalServerError = 500)

* DayOfWeek (Sunday = 0, Monday = 1, ..etc)

3- what are scenarios to use string Vs StringBuilder?

String: static strings, using threads in a system

SB: a lot of modification in some string

Part03 (Bonus)