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1) In addition to the validation uses we have seen (email addresses/phone numbers), list at least 3 other potential uses of a regular expression.

Passwords - ensure that passwords are not easily crack able.

Search engines - Perform search and replace operations based on patterns in the database.

Web Scraping - Identify and extract specific data patterns from web pages.

2) In what situation might an immutable tuple provide more functionality than a mutable list? In what situation might a mutable list provide more functionality than an immutable tuple?

immutable- Tuples are immutable, meaning their elements are unchangeable. This feature ensures data integrity and prevents accidental modifications. This is useful in situations where you want to guarantee that the data remains constant throughout the program.

Mutable- Lists are mutable, allowing dynamic changes such as appending, inserting, or removing elements. This is beneficial in scenarios where the data needs to be updated or modified frequently. These types of lists are also very common and used in most situations.

3) Compare and contrast this to writing a class for a Student (for instance, in Java). In other words, what things are easier/harder to do? Do you lose access to possibly wanted functionality when using a non-class based approach? Is there anything you can do with a record's field that could be prevented with a class's data member? Mention some differences between C# properties and Java data members.

I would say records are safer compared to normal classes and although it does make changing data more difficult. There are going to be situations where they will become useful. Another problem with records is lack be able to use inheritance, records are implicitly sealed, so you can't use them as a base class. Some differences between java data member and C# is C# allows you to define read-only properties using only a get accessor. Another thing is Unlike C#, Java doesn't have a concept of automatic properties. You explicitly define the getter and setter methods.