

Homework for Rust: Structs and Enums

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Problem 1

Define a struct named **Person** with the following fields:

- **name**: A string representing the person's name
- **age**: An integer representing the person's age
- **email**: A string representing the person's email address

After defining the **Person**, create a **Person** from this description: James is 37 years old, and his email is james@gmail.com

Problem 2

Create a struct named **Counter** with a single field **count** of type **u32**. Then, implement two methods for the **Counter** struct:

- **new**: Creates a new **Counter** instance with an initial count of 0.
- **increment**: Increments the count by 1.

Problem 3

Create an enum named **Direction** with four variants:

- **Up**
- **Down**
- **Left**
- **Right**

Implement a method named **move_point** that takes two parameters: a tuple struct **Point** with **x** and **y** coordinates (both of type **i32**) and a **Direction** instance. The method should return a new **Point** instance with the updated coordinates based on the given direction:

- **Up**: Decrease the **y** coordinate by 1
- **Down**: Increase the **y** coordinate by 1
- **Left**: Decrease the **x** coordinate by 1
- **Right**: Increase the **x** coordinate by 1

Problem 4

Create an enum named **Shape** with three variants:

- **Circle**: Takes a single parameter representing the radius (as a floating-point number).
- **Rectangle**: Takes two parameters representing the width and height (both as floating-point numbers).
- **Triangle**: Takes three parameters representing the lengths of the three sides (all as floating-point numbers).

Implement a method named **area** for the **Shape** enum that calculates and returns the area of the corresponding shape. Use the following formulas for the different shapes:

- **Circle**: $\pi \cdot \text{radius}^2$
- **Rectangle**: $\text{width} \cdot \text{height}$
- **Triangle**: $\sqrt{s \cdot (s - \text{side1}) \cdot (s - \text{side2}) \cdot (s - \text{side3})}$, where $s = \frac{\text{side1} + \text{side2} + \text{side3}}{2}$