Dylan Mohsen

DS210

HW 7

Question 1:

new_triangle, new_rectangle, new_circle: These are constructor functions for creating instances of the Shape enum corresponding to triangles, rectangles, and circles, respectively, with appropriate dimensions.

area: Calculates the area of the shape using formulas specific to each type: Heron's formula for triangles, length times width for rectangles, and pi times the radius squared for circles.

perimeter: Computes the perimeter (or circumference, for circles) based on the dimensions of the shape. It adds up sides for triangles and rectangles, and calculates $2\pi r$ for circles.

double_perimeter: Doubles the dimensions related to the perimeter of the shape, effectively doubling the perimeter itself. For triangles and rectangles, it doubles each side length, and for circles, it doubles the radius.

is_valid: Checks the validity of the shape's dimensions. For triangles, it verifies the side lengths satisfy the triangle inequality theorem. For rectangles and circles, it ensures the dimensions (length, width, radius) are positive.

Question 2:

Polygon Struct and PolygonProperties Trait:
Defines a Polygon struct that models polygons with a specified number of sides and the length of each side. The PolygonProperties trait provides methods for computing the perimeter, area, radius, and apothem of the polygon.

perimeter:
Calculates the perimeter of the polygon by multiplying the number of sides (sides) by the length of each side (side_length).

area:
Computes the area of the polygon.

radius:
Determines the radius of the circumscribed circle around the polygon.

apothem:
Calculates the apothem of the polygon, which is the radius of the inscribed circle.

Observation: As the number of sides on a polygon increases, its area approaches that of a circle with the same radius