2DCentreOfMass

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Overview

- Calculating the Centre of Mass
- Demonstration of our program
- Source Code and Testing of Code
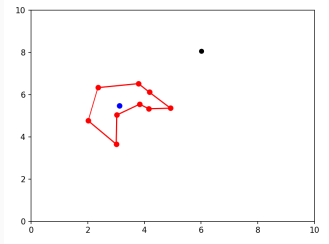- Documentation of Code

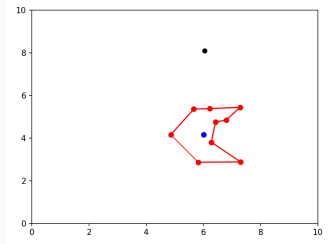# What is the centre of mass?

Figure 1: Before Pin

Figure 2: After Pin

Calculating the Centre of Mass

What formulas are we using to find the centroid?
What do we need to know before we can calculate the centroid?

Calculating the Centre Of Mass

We first need to find the area. A represents the area of the polygon and is calculated using Gauss' area formula:

$$A = \frac{1}{2} \sum_{i=0}^{n-1} (x_i y_{i+1} - x_{i+1} y_i),$$

where $(x_n, y_n) = (x_0, y_0)$ to close the polygon.

Calculating the Centre Of Mass

The centre of mass of a simple polygon can be calculated using the following formulas:

$$C_x = \frac{1}{6A} \sum_{i=0}^{n-1} (x_i + x_{i+1})(x_i y_{i+1} - x_{i+1} y_i),$$

$$C_y = \frac{1}{6A} \sum_{i=0}^{n-1} (y_i + y_{i+1})(x_i y_{i+1} - x_{i+1} y_i).$$

Source Code

The code is very modular with three classes:

- Geometry Class: Handles all geometric calculations
- Shape Class: Manages vertices and points used in calculatations
- ShapePlotter Class: Carries out all user interactions and visual representations using Matplotlib.

Demonstration

How can we use the 2DCentreOfMass library to find the centroid of a polygon, and how does it work?

Testing Of Code

How did we make sure the code was running as intended, without any errors?

Documentation

How are we documenting our code for new users?