Custom Rollercoaster Path Simulator

Develop a simulation game that allows users to create and simulate custom rollercoaster paths using different algorithms.

Game Requirements:

1. <u>User Interface:</u> **1Mark**
   a. Design a user interface (UI) that allows users to interact with the game through keyboard buttons.
   b. Include options for creating custom rollercoaster paths, such as adding straight sections (1st Key), circular loops (2nd Key), and curved segments (3rd Key). Path segements can be used multiple times.

2. <u>Rollercoaster Path Creation:</u> **3 Marks**
   a. Straight Paths: Use the DDA Line Algorithm to create straight sections of the rollercoaster path.
   b. Circular Paths: Utilize the Polar Circle Algorithm to add circular loops or segments to the rollercoaster path.
   c. Curved Paths: Incorporate the Bresenham Curve Algorithm to create curved sections of the rollercoaster path.

3. <u>Customization Options:</u> **3 Marks**
   a. Allow users to customize the properties of each path segment, such as
      i. Length: increase/decrease length of straight path using up/down keys.
      ii. Radius: increase/decrease circular path radius using up/down keys.
      iii. Curvature height: increase/decrease curve path height using up/down keys.

4. <u>Simulation Functionality:</u> **3 Marks**
   a. Implement a simulation feature that allows users to preview and simulate the rollercoaster moving through the created path.
   b. Enable users to control the speed of the simulation and view the rollercoaster's motion in real-time.

5. <u>Screen Scrolling for Simulation:</u> **3 Marks**
   a. Add screen scrolling functionality to ensure that active parts of the rollercoaster path is visible during simulation.