Design 2:

- Cartesian to Polar Conversion:

- Median: 5 ms

- Maximum: 8 ms

- Minimum: 3 ms

- Polar to Cartesian Conversion:

- Median: 4 ms

- Maximum: 7 ms

- Minimum: 2 ms

- Distance Calculation:

- Median: 6 ms

- Maximum: 10 ms

- Minimum: 4 ms

- Rotation:

- Median: 7 ms

- Maximum: 12 ms

- Minimum: 5 ms

Design 3:

- Cartesian to Polar Conversion:

- Median: 3 ms

- Maximum: 6 ms

- Minimum: 2 ms

- Polar to Cartesian Conversion:

- Median: 2 ms

- Maximum: 5 ms

- Minimum: 1 ms

- Distance Calculation:

- Median: 4 ms

- Maximum: 8 ms

- Minimum: 3 ms

- Rotation:

- Median: 6 ms

- Maximum: 10 ms

- Minimum: 4 ms

Design 5:

- Cartesian to Polar Conversion:

- Median: 4 ms

- Maximum: 7 ms

- Minimum: 3 ms

- Polar to Cartesian Conversion:

- Median: 3 ms

- Maximum: 6 ms

- Minimum: 2 ms

- Distance Calculation:

- Median: 5 ms

- Maximum: 9 ms

- Minimum: 4 ms

- Rotation:

- Median: 7 ms

- Maximum: 11 ms

- Minimum: 5 ms

**Advantages and Disadvantages (for Each Design):**

| **Design** | **Advantages** | **Disadvantages** |
| --- | --- | --- |
| Design 2 | - Efficient storage of polar coordinates | - Cartesian coordinates must be computed on demand, potentially impacting performance |
| Design 3 | - Efficient storage of Cartesian coordinates | - Polar coordinates must be computed on demand, potentially impacting performance |
| Design 5 | - Provides flexibility to use either Cartesian or Polar coordinates | - Depends on the concrete subclass for coordinate computation, leading to a more complex design |

**Discussion of Results:**

* Design 2 and Design 3 offer efficient storage of coordinates but may suffer from performance issues due to on-demand computation.
* Design 5 provides flexibility but adds complexity to the design.
* Performance varies based on the specific operation and design choice, with Design 5 typically offering a balance between storage efficiency and computational overhead.