

IS THIS OBJECT A CIRCLE?

Given a simple closed curve in the plane S , we seek simple algorithms that will identify S as not being a circle. Specifically, we wish to identify noncircles via algorithms that measure chords.

We'll identify a simple closed curve $C \in \mathbb{R}^2$ as a circle if

$$C \subset \{x^2 + y^2 = 1 + \epsilon\}$$

where ϵ is a numerical tolerance on the circle. Given

$$S \not\subset \{x^2 + y^2 = 1 + \epsilon\}$$

we wish to examine the methods of determining this non-inclusion by

- (1) Measuring relative arc length.
- (2) Measuring angles.
- (3) Measuring chords.
- (4) Measuring widths.

Suppose we fish some device out of the ocean with a face whose perimeter is given by a simple closed curve, S . To what degree can we determine if S is a circle by measuring chords and diameters?

REFERENCES

[label1] A. Ricotta, "Constant-Diameter Curves," *The Mathematical Intelligencer* **25**, no. 4, 2003, 4–5.