Quiz   **Name**
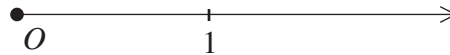
1. Consider the polar function $f(\theta) = \frac{2}{1+\frac{1}{3}\cos\theta}$. Because $\frac{1}{3} < 1$, its graph is an ellipse. Find its semimajor and semiminor axes, determine the "box" of the ellipse, and draw a careful graph of the ellipse into the coordinate plane below.

O 1

2. In the context of Problem 1 compute $\sqrt{f(\theta)^2 + f'(\theta)^2}$ and explain the meaning of the integral $\int_0^{2\pi} \sqrt{f(\theta)^2 + f'(\theta)^2}\, d\theta.$

3. Use information from Problem 1 to provide a rough estimate for the integral in Problem 2.

Formulas: $a = \frac{d}{1-\varepsilon^2}$ $b = \frac{d}{\sqrt{1-\varepsilon^2}}$ $a = \frac{d}{\varepsilon^2-1}$ $b = \frac{d}{\sqrt{\varepsilon^2-1}}$