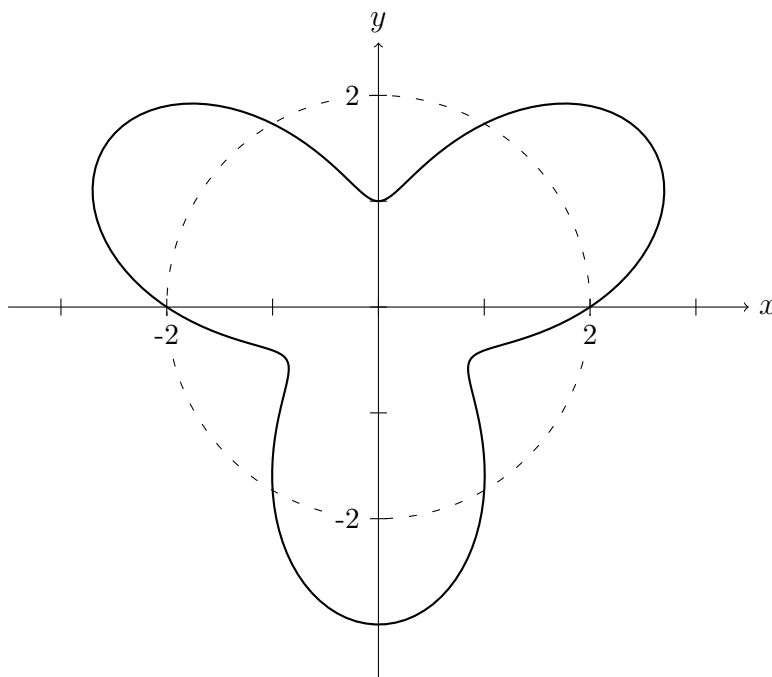


1. [9 points] While assembling a large fan as a holiday gift, you discover the following lovely diagram in the instruction manual. The propeller and base of the fan are illustrated by the polar curve  $r = 2 + \sin(3\theta)$  and the circle  $r = 2$ , respectively.



- a. [5 points] Write down, but do **not** evaluate, an integral that gives the arc length of the part of the propeller **outside** the circle in the **first quadrant**.
- b. [4 points] Write down the Cartesian equation of the tangent line to the **propeller** at the point  $(x, y) = (2, 0)$ .