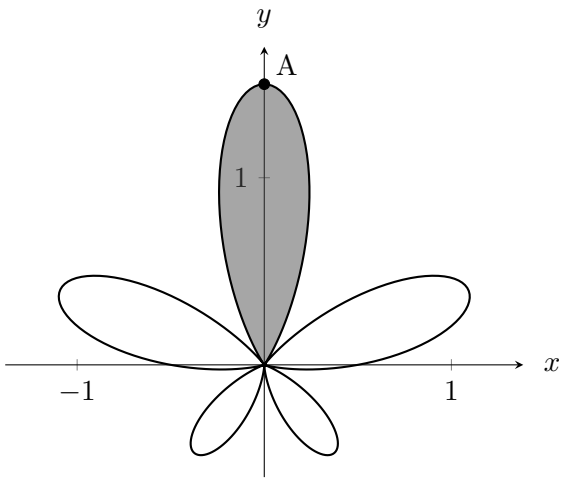
9. [10 points]

As part of a new logo design for his varsity team, Jake wants to recreate the shape of a buckeye leaf, the symbol of his home state. He models the leaf's outline, shown in the figure to the right, using the polar equation $r = \left(\frac{1}{2} + \frac{1}{2}\sin(5\theta)\right)\left(1 + \frac{1}{2}\sin(\theta)\right)$, where the leaf is traced out once as θ ranges from 0 to 2π.



a. [4 points] Find all the values of θ in the interval $[0, 2\pi)$ for which the curve passes through the origin.

Answer: $\theta =$ _____

b. [2 points] The point A, labeled above, is the tip of the buckeye leaf. Write A in polar coordinates (r, θ), with $0 \leq \theta < 2\pi$.

Answer: $A : (r, \theta) =$ _____

c. [4 points] Jake wants to paint the largest leaflet green, shown as the shaded region in the figure. Write an expression involving one or more integrals that represents the area of this leaflet. **Do not** evaluate your expression.

Answer: _____