5. [9 points]
Mike owns Mike's Sweet Haven, a bakery that specializes in elegant, custom-made baked goods. He uses precise mathematical models to calculate the exact volumes of various bakery items based on their shapes and sizes. This approach ensures he maintains high quality without running out of ingredients or wasting supplies.

He decides to bake artisan bread using region A as the base, which is bounded by the curves

$$y = \frac{\sqrt{4 - x^2}}{2}, \text{ and } y = -\frac{\sqrt{4 - x^2}}{2}.$$

as illustrated to the right.
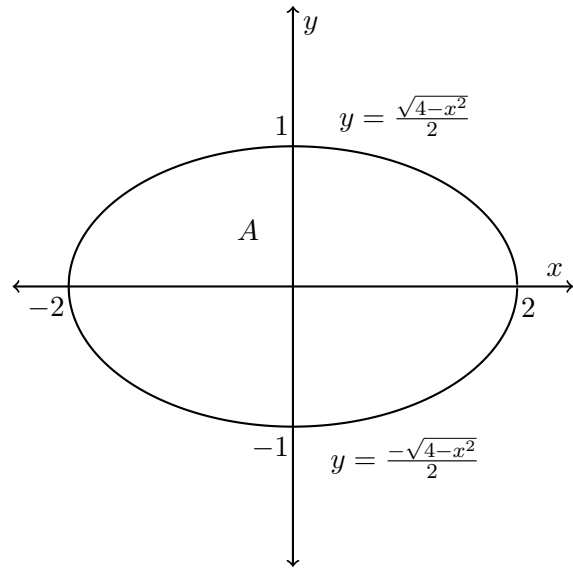
a. [5 points] Write an expression involving one or more integrals for the volume of an artisan bread whose base is the region A, and whose cross-sections perpendicular to the x-axis are semicircles. **Do not** evaluate any integrals in your expression.

Answer: _____

b. [4 points] Determine the perimeter of region A. Write an expression that involves **exactly one** integral.

Answer: _____