6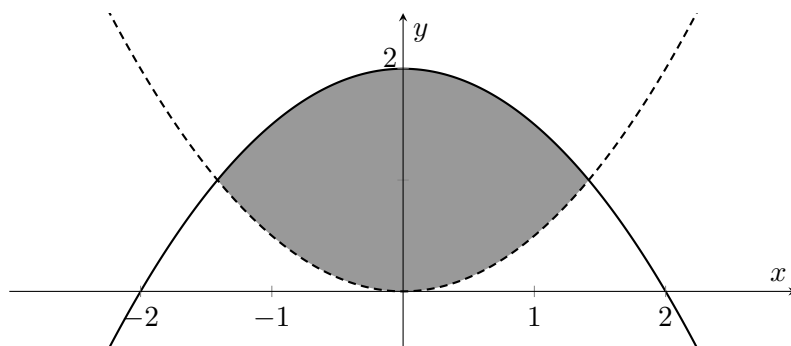. [9 points] A video game designer wants to model the shape of a mountain. The base of the mountain is the shaded region depicted below, bounded by the curves

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

a. [5 points] Write an expression involving one or more integrals for the volume of a mountain whose base is the shaded region, 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 the shaded region. Write an expression that involves one or more integrals. **Do not** evaluate any integrals in your expression.

Answer: _____