4. [11 points] Consider the shaded region bounded by \( f(x) = 2 \cos^2 \left( \frac{\pi x}{2} \right) \) and 
\( g(x) = \sqrt{4 - (x - 2)^2} + 2 \) shown below.

![Graph showing the region bounded by the curves \( f(x) \) and \( g(x) \).]

a. [6 points] Write, but do not compute, an integral for the solid formed by rotating the region around the line \( x = 5 \).

b. [5 points] Write, but do not compute, an expression involving one or more integrals for the perimeter of the region above. *Hint: The upper curve is a semicircle.*