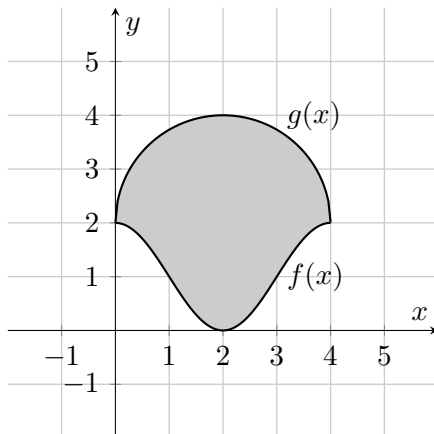4. [11 points] Consider the shaded region bounded by $f(x) = 2\cos^2\left(\frac{\pi x}{2}\right)$ and $g(x) = \sqrt{4 - (x-2)^2} + 2$ shown below.

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.*