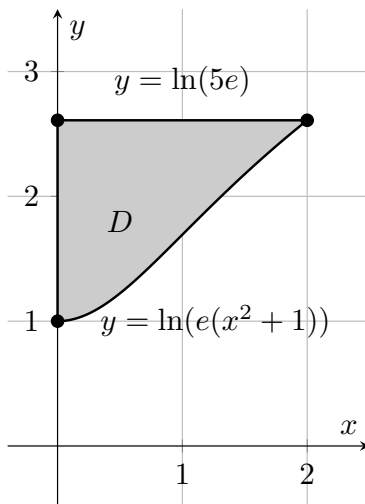**4.** [16 points] Consider the region D in the xy−plane bounded between $y = \ln(e(x^2 + 1))$ and $y = \ln(5e)$ for x values between 0 and 2. A sketch of the region is shown below.

a. [6 points] Using the washer method, find an expression involving one or more integrals for the volume of the solid formed by rotating the region D around the x-axis. Do not evaluate your integral(s).

b. [6 points] Using the shell method, find an expression involving one or more integrals for the volume of the solid formed by rotating the region D around the line $x = 2$. Do not evaluate your integral(s).

4. (continued) Here is a reproduction of the plot on the previous page:
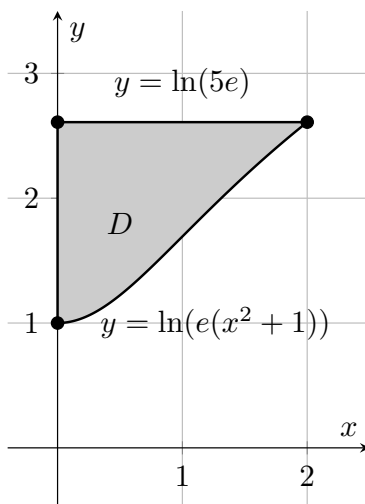
c. [4 points] Find an expression involving one or more integrals for the perimeter of the region D. Do not evaluate your integral(s).