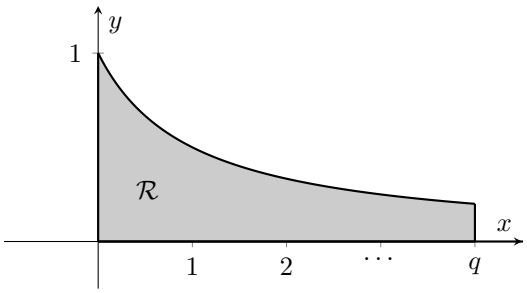
2. [11 points] Consider the function $f(x) = e^{-2x}$, and the region $\mathcal{R}$ bounded by the x-axis, the y-axis, $y = f(x)$ and $x = q$, where q is a positive constant larger than 2.



a. [4 points] Give a formula for, but do not compute, the volume of the solid formed by rotating the region $\mathcal{R}$ around the y-axis. Your answer should depend on q. *(Hint: Use the shell method)*

b. [4 points] Compute the integral you found in part a). Your final answer should be in terms of q.

c. [3 points] Taking a limit of your answer in b), compute the volume of the infinitely long solid of revolution formed by rotating the region $\mathcal{R}$ around the y-axis. Be sure to show how you got the value of your limit.