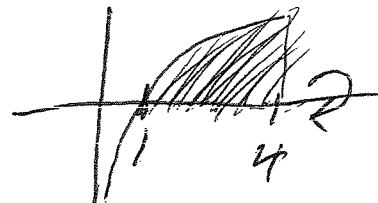


Name solutions

You have 15 minutes for this quiz – no calculators allowed.



Let \mathbf{R} be the region bounded by the x -axis and the graph of $y = \ln x$ on the interval $[1, 4]$. Set up, but do not evaluate, definite integrals which represent the given quantities. Use proper notation. Each problem is worth 2 points.

1. The volume of the solid obtained when \mathbf{R} is revolved around the x -axis.

$$V = \int_1^4 \pi (\ln x)^2 dx$$

or

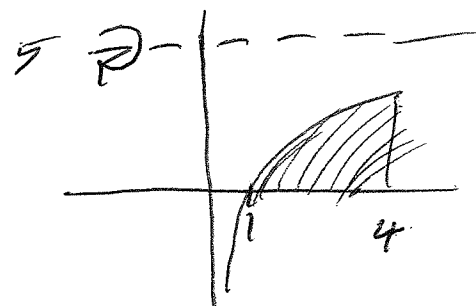
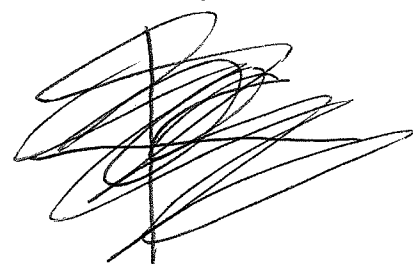
$$V = \int_0^{\ln 4} 2\pi y (4 - e^y) dy$$

2. The volume of the solid obtained when \mathbf{R} is revolved around the horizontal line $y = 5$.

$$V = \int_1^4 (\pi (5)^2 - \pi (5 - \ln x)^2) dx$$

or

$$V = \int_0^{\ln 4} 2\pi (5 - y) (4 - e^y) dy$$



3. The volume of the solid obtained when **R** is revolved around the y -axis.

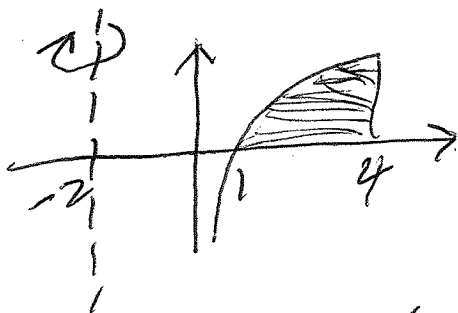


$$V = \int_1^4 2\pi x \ln x \, dx$$

or

$$V = \int_0^{\ln 4} (\pi (4)^2 - \pi (e^y)^2) \, dy$$

4. The volume of the solid obtained when **R** is revolved around the vertical line $x = -2$.



$$V = \int_1^4 2\pi (x+2) \ln x \, dx$$

or

$$V = \int_0^{\ln 4} (\pi (6)^2 - \pi (e^y+2)^2) \, dy$$

5. The volume of the solid with base **R** for which the cross-sections perpendicular to the x -axis are semi-circles.

~~$$V = \int_1^4 \frac{1}{2} \pi \left(\frac{\ln x}{2} \right)^2 \, dx$$~~

$$V = \int_1^4 \frac{1}{2} \pi \left(\frac{\ln x}{2} \right)^2 \, dx$$