$e^y = x$ $x \cdot y = 5$
$x = 5 - y$

Let R be the region in the first quadrant bounded by the x-axis and the graphs of $y = \ln x$ and $y = 5 - x$, as shown in the figure.

$(3.69344, 1.30656) = (A, B)$

$y = \ln x$

$y = k$ R $y = 5 - x$

3.693 5

A) Find the area of R.

$$A$$
$$\text{Area} = \int_1^A \ln x \, dx + \int_A^5 (5-x) \, dx$$

$$= 2.132 + 0.854$$

$$\text{Area} = 2.986 \, un^2$$

or

$$\text{Area} = \int_0^B \left[(5-y) - e^y \right] dy$$

B) Region R is the base of a solid. For the solid, each cross section perpendicular to the x-axis is a square. Write, but do not evaluate, an expression involving one or more integrals that gives the volume of the solid.

$$V = \int_1^A (\ln x)^2 \, dx + \int_A^5 (5-x)^2 \, dx$$
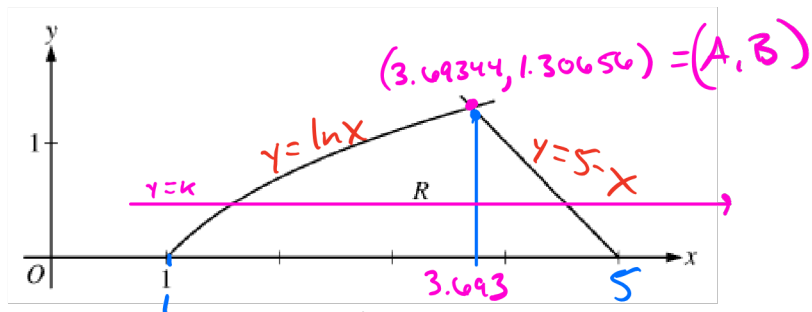
C) The horizontal line $y = k$ divides R into two regions of equal area. Write, but do not solve, an equation involving one or more integrals whose solution gives the value of k.

$$\int_0^k \left[(5-y) - e^y \right] dy = \frac{1}{2} (2.986)$$

or

$$\int_0^k \left[5 - y - e^y \right] dy = \int_k^B \left[5 - y - e^y \right] dy$$