Name: _____ Calculator ACTIVE Unit 6 Five 'n' One **AM**

Points Earned	14	13	12/11	10/9	8/7	6	5	4	3/2/1/0
Grade	100	94	89	84	79	74	69	60	45

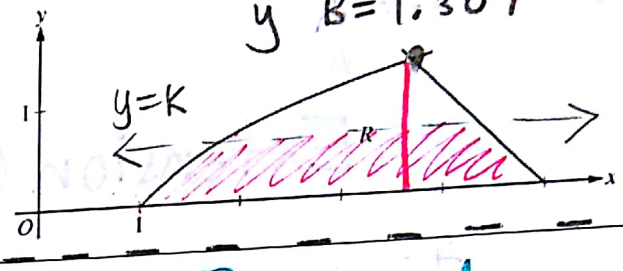
Let R be the region in the first quadrant bounded by the x-axis and the graphs of $y = \ln x$ and $y = 5 - x$, as shown in the figure below.

$x = y - 5$ $x = 5 - y$

$x = -y + 5$ $x = e^y$

x A = 3.693

y B = 1.307



a) Find the area of R.

$$\int_1^A (\ln x)\,dx + \int_A^5 (5-x)\,dx$$

OR

$$\int_0^B (5-y-e^y)\,dy$$

① integrand
① limits
① answer

2.985 or 2.986

dx

b) Region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is square. Find the volume of the solid.

$$\int_1^A (\ln x)^2\,dx + \int_A^5 (5-x)^2\,dx$$

① integrands
① limits
① answer

2.784

y

c) The horizontal line $y = k$ divides R into two regions with equal areas. Write, but do not solve, an equation involving one or more integrals whose solution gives the value k.

$$\int_0^K (5-y-e^y)\,dy = \frac{1}{2}(2.986)$$

1.493

① integrand
① limits
① equation

Extension Questions:

d) $A = \frac{1}{2}\pi r^2$ $\quad d = (\ln x)$ $\quad d = 5 - x$

$A = \frac{1}{2}\pi\left(\frac{(\ln x)}{2}\right)^2$ $\quad r = \frac{(\ln x)}{2}$ $\quad r = \frac{5-x}{2}$

$A = \frac{1}{2}\pi\left(\frac{5-x}{2}\right)^2$

$$\frac{\pi}{8}\int_1^A (\ln x)^2\,dx + \frac{\pi}{8}\int_A^5 (5-x)^2\,dx$$

$$\frac{\pi}{8}(2.041) + \frac{\pi}{8}(.743) = \frac{\pi}{8}(2.784)$$

$.801 + .292$

1.093

e) around $y = -1$

$$\pi \cdot \int_1^A \left[(\ln x - (-1))^2 - (0-(-1))^2\right]dx + \pi\int_A^5 \left[(5-x-(-1))^2 + (0-(-1))^2\right] dx$$