

AP Calculus AB
Unit 7 – Day 6 – Assignment

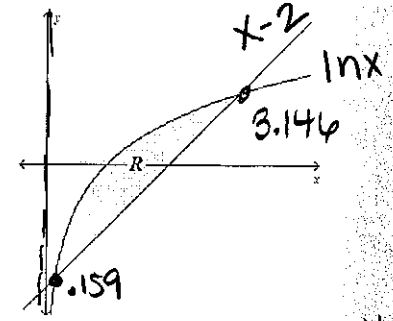
Name: Answer Key*

Let R be the region bounded by the graphs of $y = \ln x$ and the line $y = x - 2$ as shown below. Though you may use a calculator, show the integral that you found to arrive at your answer.

1. Find the coordinates of the points at which the two graphs intersect each other. Then, find the area of R .

$(.159, -1.841)$ & $(3.146, 1.146)$

$$A = \int_{.159}^{3.146} \ln x - (x-2) dx = \boxed{1.949}$$



2. Find the volume of the solid generated when R is rotated about the horizontal line $y = -3$.

$$V = \pi \int_{.159}^{3.146} [\ln x - (-3)]^2 - [x-2 - (-3)]^2 dx = \pi \int_{.159}^{3.146} [\ln x + 3]^2 - [x+1]^2 dx = \boxed{34.199}$$

3. Write and evaluate an integral expression that can be used to find the volume of the solid generated when R is rotated about the y -axis.

$y = \ln x$ $y = x - 2$
 $e^y = x$ $y + 2 = x$

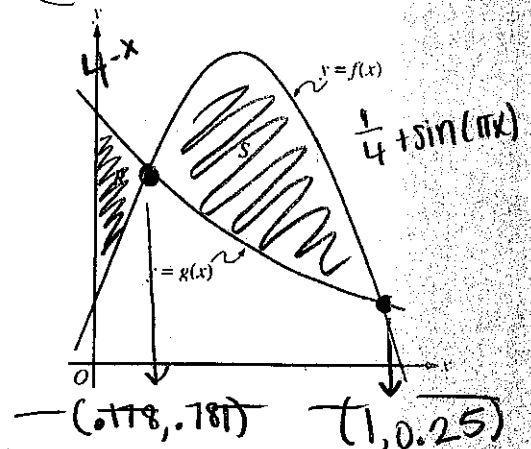
$$V = \pi \int_{-1.841}^{1.146} [y+2-0]^2 - [e^y-0]^2 dy = \pi \int_{-1.841}^{1.146} (y+2)^2 - (e^y)^2 dy = \boxed{17.099}$$

Let f and g be the functions given by $f(x) = \frac{1}{4} + \sin(\pi x)$ and $g(x) = 4^{-x}$. Let R be the region in the first quadrant enclosed by the y -axis and the graphs of f and g , and let S be the region in the first quadrant enclosed by the graphs of f and g shown to the right. Though you may use a calculator, show the integral that you found to arrive at your answer.

4. Find the volume of the solid generated when R is revolved about the horizontal line $y = 8$.

$$V = \pi \int_0^{.178} \left[\frac{1}{4} + \sin(\pi x) - 8 \right]^2 - \left[4^{-x} - 8 \right]^2 dx$$

$$\boxed{V = 2.979}$$



5. Find the volume of the solid generated when S is revolved about the horizontal line $y = -1$.

$$V = \pi \int_{.178}^1 \left[\frac{1}{4} + \sin(\pi x) - (-1) \right]^2 - \left[4^{-x} - (-1) \right]^2 dx = \boxed{4.559}$$