

WARM UP - No Calculator

1. $\int_1^e \frac{\ln t}{t} dt$

2. **Multiple Choice** Let f and g be the functions given by $f(x) = e^x$ and $g(x) = 1/x$. Which of the following gives the area of the region enclosed by the graphs of f and g between $x = 1$ and $x = 2$?

(A) $e^2 - e - \ln 2$

(B) $\ln 2 - e^2 + e$

(C) $e^2 - \frac{1}{2}$

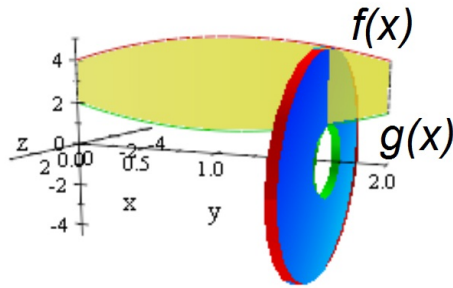
(D) $e^2 - e - \frac{1}{2}$

(E) $\frac{1}{e} - \ln 2$

VOLUMES OF REVOLUTIONS (WASHER METHOD)

Objective:

- Find the volume of a plane rotated around the x or y-axis



$$V = \pi \int_a^b [(f(x))^2 - (g(x))^2] dx$$

$$V = \pi \int_a^b (R^2 - r^2) dx$$

$$V = \pi \int_c^d (R^2 - r^2) dy$$

STEPS

- Draw a picture and identify the region.
- The cross-sections (washers) must be perpendicular to the axis of rotation.
- If rotated around x-axis then x-limits, dx
- If rotated around y-axis then y-limits, dy

*Don't forget to square each radius
BEFORE subtracting them.

Ex.1: Find the volume when the region bounded by $y = e^x$ and $y = \sqrt{x + 2}$ is rotated about the x-axis.

Ex.2: Find the volume of the solid generated when the area bounded by the curve $y = x^3 - x + 1$, $x = -1$, and $x = 1$ are revolved around the x-axis

Ex.3: Find the volume of the solid generated when the area bounded by the lines $y = 6x - 3$, $x = 0$, and $y = 6$ is revolved around the y -axis.

Ex.4: Find the volume generated by revolving about the y -axis the region in the first quadrant bounded by the graph of $y = \ln x$ and the line $x = e$.

CLASSWORK (No calculator #1, 2, & 5)

Rotate the region bounded by:

1. $y = 3$, y -axis, and $y = \sqrt{x}$ about the y -axis.
2. $y = 2x^2$ and $y = x^3$ about the x -axis.
3. $y = 6e^{-2x}$, $y = 6 + 4x - 2x^2$, $x = 0$, $x = 1$ about x -axis.
4. $x = y^3$, $x = 0$, $y = 2$ about the x -axis.
5. $x = y^3$, $x = 0$, $y = 2$ about the y -axis.
6. $x = 5 - y^2$ and $x = 4$ about the y -axis