

In each problem set up the integrals needed to find the indicated quantity. Include a sketch of the region and/or solid. Evaluate the integrals exactly. Show all work.

Area Problems

- The area of the region bounded between $y = x^2 + 2x - 3$ and $y = 4x + 45$.
- The area of the region bounded by $y = \ln x$, the x and y axes, and $y = 3$
 - With respect to x .
 - With respect to y .
- The area of the region in quadrant I bounded by $x^2 + y^2 = 8$, $x = \frac{1}{2}y^2$, and $y = 0$
 - With respect to x .
 - With respect to y .

Volume Problems

- Find the volume of the solid whose base is the region in quadrant I that is bounded by $y = x^3$, $y = 0$, and $x = 2$. All cross-sections perpendicular to the x -axis are
 - Rectangles with height twice the width.
 - Semi-circles.
- The volume of the solid generated by rotating the region bounded by $y = 3^x$, $y = 0$, between $x = 0$ and $x = 4$ around the x -axis
- The volume of the solid generated by rotating the first enclosed region in quadrant I bounded by $y = \sin x$ and $y = \cos x$ around the x -axis.
- The volume of the solid generated by rotating the region bounded by $y = \sqrt{x+4}$, $x = 0$, and $y = 3$ around the y -axis.
- The volume of the solid generated by rotating the region in quadrant I bounded by $y = x^2 + 1$, $x = 1$ and $y = 10$ around
 - The line $y = 10$.
 - The line $x = 3$.
 - The line $y = -1$.
- Estimate the volume of a lake with the given measurements.

Depth (measured from the surface in ft)	0	10	20	30	40
Diameter (measured in hundreds of ft)	26	22	14	7	2