

Ex. 1 Compute the integral $\iint_D xy \, dx dy$, over the region D bounded by $y = x^2$, $y^2 = x$.

Ex. 2 Compute the area of the region bounded by $y = x$, $y = \frac{1}{x}$, $y = 2$, using double integral.

Ex. 3 Compute the volume of the three-dimensional region A bounded by $z = \sqrt{x^2 + y^2}$, $z = x^2 + y^2$.

Ex. 4 Let $V = \{(x, y, z) : x \geq 0, z + x^2 + y^2 \geq 0, z \leq \sqrt{x^2 + y^2}, x^2 + y^2 \leq 1\}$. Describe the set V by corresponding inequalities in the cylindrical coordinates.

Ex. 5 Find the general solution and determine its domain: $y' = \frac{1+x}{x^2 y^2}$.

Ex. 6 Find the general solution of the homogeneous differential equation and determine its domain: $y' x^2 = y^2 + yx$.

Ex. 7 Solve the initial problem: $y' + y = e^{-x}$, $y(0) = 5$. Apply "guessing method".