Problem

Calculate the volume given by the double integral below:

$$\int_0^1 \int_0^2 5xy + 3 \, dx \, dy$$

Solution

First, we integrate over x, then over y.

$$\int_0^1 \int_0^2 5xy + 3 \, dx \, dy = \int_0^1 5y \frac{x^2}{2}\Big|_0^2 + 3x|_0^2 \, dy = \int_0^1 10y + 6 \, dy = 10\frac{y^2}{2}\Big|_0^1 + 6y|_0^1 = 5 + 6 = \mathbf{11}$$

Answer: 11