



Problem:

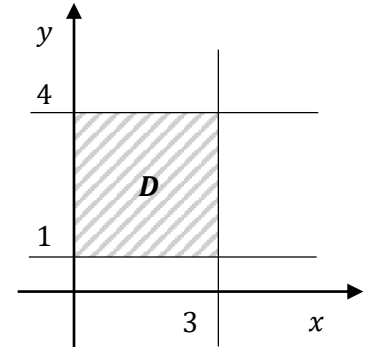
Find the double integral over the given region:

$$\iint_D (x^3 + y^3) dx dy, \quad D: \begin{cases} x = 0, & x = 3 \\ y = 1, & y = 4 \end{cases}$$

Solution:

Shaded is the region $D \Rightarrow$ the double integral will be:

$$\begin{aligned} \iint_D (x^3 + y^3) dx dy &= \int_0^3 dx \int_1^4 (x^3 + y^3) dy = \int_0^3 \left[x^3 y + \frac{1}{4} y^4 \right]_{y=1}^{y=4} dx = \\ &= \int_0^3 \left(4x^3 + 64 - x^3 - \frac{1}{4} \right) dx = \int_0^3 \left(3x^3 + \frac{255}{4} \right) dx = \left(\frac{3}{4} x^4 + \frac{255}{4} x \right) \Big|_0^3 = \\ &= \frac{3}{4} \cdot 3^4 + \frac{255}{4} \cdot 3 = 252. \end{aligned}$$



Answer: 252.