

Taker Name:

Key

GTID: 90

Section:

Grader #1:

GTID: 90

§15.3: Area and Average Value

Find the average value of $f(x, y)$ over the region R .

$$f(x, y) = \frac{1}{xy}, \quad R = [\ln 2, 2 \ln 2] \times [\ln 2, 2 \ln 2]$$

$$\text{Vol} = \int_{\ln 2}^{2 \ln 2} \int_{\ln 2}^{2 \ln 2} \frac{1}{xy} dy dx = \int_{\ln 2}^{2 \ln 2} \frac{1}{x} \ln y \Big|_{\ln 2}^{2 \ln 2}$$

$$= \int_{\ln 2}^{2 \ln 2} \frac{1}{x} \left[\ln(2 \ln 2) - \ln(\ln 2) \right] dx$$

$\ln 2 + \ln(\ln 2) - \ln(\ln 2)$ $\ln ab = \ln a + \ln b$

$$= \int_{\ln 2}^{2 \ln 2} \frac{1}{x} \ln 2 dx = \ln 2 \left(\ln x \Big|_{\ln 2}^{2 \ln 2} \right)$$

$$= \ln 2 \left[\ln(2 \ln 2) - \ln 2 \right] = (\ln 2)^2$$

$$\text{and Area } R = (2 \ln 2 - \ln 2)^2 = (\ln 2)^2$$

$$\text{So } \text{Avg}_R(f) = \frac{1}{\text{Area } R} * \text{Vol} = \frac{1}{(\ln 2)^2} * (\ln 2)^2 = 1$$

A

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G2:

A

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G3:

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