SHOW YOUR WORK PLEASE

Problem 1 (3 points) Determine whether the statement is TRUE or FALSE. Explain WHY.

(A) If \( \mathbf{F} \) is a vector field, then \( \text{div} \mathbf{F} \) is a vector field.

\[ \int_0^1 \int_0^x x^2 \sin(x + y) \, dy \, dx \]

\[ = \int_0^x \int_0^1 x^2 \sin(x + y) \, dy \, dx \]

Answer

Problem 2 (3 points) Write \( \iint_R f(x, y) \, dA \) as an iterated integral where \( R \) is the region shown and \( f \) is an arbitrary function on \( R \).
Problem 3 (3 points) Evaluate the integral

\[ \iint_D \frac{1}{1 + x^2} dA \]

D is the triangular region with vertices (0,0), (1,1), (0,1).

**Answer**

Problem 4 (2 points) Find the Jacobian of the transformation

\[ x = uv, \quad y = vw, \quad z = uw \]

**Answer**
Problem 5 (4 points) Evaluate the integral

\[ \int_C x^3 y \, dx - x \, dy \]

(A) C is the circle \( x^2 + y^2 = 1 \) with counterclockwise orientation

(B) C consists of the line segments from (0,0) to (1,1) and from (1,1) to (2,5) - B part set up ONLY.

ANSWER: