That funny vector field

The vector field

\[
\mathbf{F} = \left\langle \frac{-y}{x^2 + y^2}, \frac{x}{x^2 + y^2} \right\rangle
\]

is conservative on the right half-plane

\[D_1 = \{(x, y) \mid x > 0\}\]

but \emph{not conservative} on the plane minus the origin

\[D_2 = \{(x, y) \mid (x, y) \neq (0, 0)\}\]

True or False?

\[\text{A} \quad \text{True.}\]

\[\text{B} \quad \text{False.}\]

\[\text{C} \quad \text{I don’t know.}\]
The slice area

In this slice with $x$ fixed, the area $A(x)$ of the slice is...

A $\int_{a}^{b} f(x, y) \, dy$

B $\int_{a}^{b} f(x, y) \, dx$

C $\int_{c}^{d} f(x, y) \, dy$

D $\int_{c}^{d} f(x, y) \, dx$

E I don't know what you mean.
Compute the same integral over $R = [0, 1] \times [0, 1]$

$$\int\int_{R} \left(x^2 y + y^2 + x + 4\right) dA$$

as an iterated integral, integrating *in the other order*.

Did you get the same answer?

A Yes.

B No.

C I don’t know what you mean.
Compute the volume above the unit square $[0, 1] \times [0, 1]$ in the $xy$–plane and below the graph $z = x^2 + y^2 + 1$. 

A $\frac{1}{2}$  
B $\frac{5}{4}$  
C $\frac{5}{3}$  
D $\frac{8}{3}$  
E 2