

Multiple Integration
Iteration of Double Integrals

Question

Calculate the given double integral by iteration.

$$\iint_S (\sin x + \cos y) dA$$

With S being the square $0 \leq x, y \leq \pi/2$.

Answer

$$\begin{aligned} & \iint_S (\sin x + \cos y) dA \\ &= \int_0^{\pi/2} dx \int_0^{\pi/2} (\sin x + \cos y) dy \\ &= \int_0^{\pi/2} dx (y \sin x + \sin y) \Big|_{y=0}^{y=\pi/2} \\ &= \int_0^{\pi/2} \left(\frac{\pi}{2} \sin x + 1 \right) dx \\ &= \left(-\frac{\pi}{2} \cos x + x \right) \Big|_0^{\pi/2} \\ &= \frac{\pi}{2} + \frac{\pi}{2} = \pi \end{aligned}$$