

1. Let  $f(x, y) = x \sin y$ . Compute  $\iint_R f(x, y) dA$  where  $R$  is the rectangle  $2 \leq x \leq 4$ ,  $0 \leq y \leq \frac{\pi}{2}$ .

Solution: We have

$$\begin{aligned} \iint_R f(x, y) dA &= \int_2^4 \int_0^{\frac{\pi}{2}} x \sin y dy dx \\ &= \int_2^4 [-x \cos y]_0^{\frac{\pi}{2}} dx \\ &= \int_2^4 x dx \\ &= \left[ \frac{x^2}{2} \right]_2^4 \\ &= 8 - 2 \\ &= 6. \end{aligned}$$

2. Compute  $\iiint_W z e^{xy} dV$  where  $W$  is the solid region  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $-1 \leq z \leq 1$ .

Solution: We have

$$\begin{aligned} \iiint_W e^{xy} dV &= \int_0^1 \int_0^1 \int_{-1}^1 z e^{xy} dz dy dx \\ &= \int_0^1 \int_0^1 \left[ \frac{z^2 e^{xy}}{2} \right]_{-1}^1 dy dx \\ &= \int_0^1 \int_0^1 \left[ \frac{e^{xy}}{2} - \frac{e^{xy}}{2} \right] dx dy \\ &= \int_0^1 \int_0^1 0 dy dx \\ &= 0. \end{aligned}$$