

Trippelintegral

Eksempel 9

Beregn $\iiint_B e^{x+y+z} dV$, der $B = [0,1] \times [0,1] \times [0,1]$.

$$\begin{aligned}\iiint_B e^{x+y+z} dV &= \int_0^1 \int_0^1 \int_0^1 e^{x+y+z} dx dy dz \\ &= \int_0^1 \int_0^1 \left[e^{x+y+z} \right]_{x=0}^1 dy dz \\ &= \int_0^1 \int_0^1 (e^{1+y+z} - e^{y+z}) dy dz \\ &= \int_0^1 \left[e^{1+y+z} - e^{y+z} \right]_{y=0}^1 dz \\ &= \int_0^1 (e^{2+z} - e^{1+z} - e^{1+z} + e^z) dz \\ &= \left[e^{2+z} - 2e^{1+z} + e^z \right]_0^1 \\ &= e^3 - 2e^2 + e - e^2 + 2e - 1 \\ &= e^3 - 3e^2 + 3e - 1 = \underline{\underline{(e-1)^3}}\end{aligned}$$

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