Exercises

E0.1 [2GT]Difficulty:*. Fix $n \in \mathbb{N}, n \geq 1$. Let $a_1, \ldots, a_n \in \mathbb{R}$: then

$$\int_0^{a_1} \int_0^{a_2} \cdots \int_0^{a_n} \cos(x_1 + x_2 + \cdots x_n) \, \mathbb{d}x_1 \, \mathbb{d}x_2 \cdots \, \mathbb{d}x_n =$$

$$= 2^n \cos\left(\frac{\sum_{i=1}^n a_i}{2}\right) \prod_{i=1}^n \sin\left(\frac{a_i}{2}\right)$$

$$\int_0^{a_1} \int_0^{a_2} \cdots \int_0^{a_n} \sin(x_1 + x_2 + \cdots x_n) \, \mathbb{d}x_1 \, \mathbb{d}x_2 \cdots \, \mathbb{d}x_n =$$

$$= 2^n \sin\left(\frac{\sum_{i=1}^n a_i}{2}\right) \prod_{i=1}^n \sin\left(\frac{a_i}{2}\right)$$