Exercise 0.0.1  Give a pictorial geometric interpretation (in \( \mathbb{E}^n \)) for Exercise 0.0.16, part \((v)\).

Exercise 0.0.2  Give a pictorial geometric interpretation (in \( \mathbb{E}^n \)) for Exercise 0.0.27.

Exercise 0.0.3  Prove that the cross-product in \( \mathbb{E}^3 \) satisfies the \textit{Jacobi identity}, which states:

Given \( u, v, w \in \mathbb{E}^3 \), we have 
\[
\[u \times (v \times w)] + [w \times (u \times v)] + [v \times (w \times u)] = 0.
\]

Exercise 0.0.4  Let \( C[a,b] = \{ f : [a, b] \to \mathbb{R} \mid f \text{ is continuous} \} \), and define:

\[
\langle f, g \rangle = \int_a^b f(x)g(x) \, dx.
\]

i. Prove that \( \langle \cdot, \cdot \rangle \) is a positive-definite symmetric bilinear form on \( C[a,b] \).

ii. Fix \( a = 0 \) and \( b = 1 \), and let \( f(x) = x \) and \( g(x) = x^2 \).

- Compute \( ||f||, ||g||, \) and \( ||f - g|| \).
- Compute \( \text{proj}_f(g) \).
- Find a vector \( h \) that is orthogonal to both \( f \) and \( g \).