Quantum Field Theory 2 – Tutorial 3

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Problem 1: Grassmann algebra

Consider a set of Grassmann generators c_1, \ldots, c_n . Show that the set \mathcal{G} of linear combinations

 $a = a^{(0)} + a_i^{(1)}c_i + a_{ij}^{(2)}c_ic_j + \dots + a^{(n)}c_1c_2\dots c_n,$

with complex numbers $a^{(0)}, a_i^{(1)}, \ldots, a^{(n)}$, forms an algebra. To that end, you have to show first that the set is a vector space over the complex numbers with the corresponding rules for addition and scalar multiplication. Thereafter, you have to define an appropriate rule to multiply two elements of \mathcal{G} .

Which elements of the Grassmann algebra \mathcal{G} have an inverse?