

Homework 1

Geometrical methods in theoretical physics HT-15

1. Consider the complex projective space $\mathbb{C}\mathbb{P}^3$ which is defined as collection of 4 complex coordinates

$$(z_1, z_2, z_3, z_4) \in \mathbb{C}^4 - \{0\}$$

together with the identification

$$(z_1, z_2, z_3, z_4) \sim (\lambda z_1, \lambda z_2, \lambda z_3, \lambda z_4), \quad \lambda \in \mathbb{C}, \quad \lambda \neq 0.$$

Please, show that $\mathbb{C}\mathbb{P}^3$ is a complex manifold by giving explicitly the holomorphic atlas (patches and the holomorphic change of coordinates).

2. Explain why $\mathbb{C}\mathbb{P}^3$ is a quotient $S^7/U(1)$.

to be handed in before 5 p.m., January 15, 2016