Assignment 10

1. Prove that a projection operator on the plane is of the form \( P = \frac{1}{2} (I + \hat{n} \cdot \hat{n}) \).

2. Prove that the set of all projection operators on the plane is isomorphic to \( \mathbb{R} \) under the operation of addition.

3. Suppose \( \hat{A} \) is a projection operator on the plane with \( \hat{A}^2 = \hat{A} \). Then \( \hat{A} \) is called a projection operator. Prove that if \( \hat{A} \) is a projection operator on the plane, then there exists a vector \( \vec{v} \) such that \( \hat{A} \vec{v} = \vec{v} \).

4. Prove that if \( \hat{A} \) is a projection operator on the plane, then \( \hat{A}^2 = \hat{A} \).

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GROUP 2

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13. Prove that if \( \hat{A} \) is a projection operator on the plane, then \( \hat{A}^2 = \hat{A} \).