605 - Discussion 4

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T10 Exercise MM.T35 asked you to show that AA^* is Hermitian. Prove directly that AA^* is a normal matrix.

We have the condition for a matrix to be Hermitian.:

$$A = A^*$$

When a matrix is equal to its adjoint.

and the condition for a matrix to be normal:

$$A^*A = AA^*$$

If a matrix commutes with its adjoint. Given these two conditions we can show that every Hermitian matrix is also a Normal matrix:

If this is true:

$$1. \quad A = A^*$$

then it follows that:

$$2. \quad AA = A^*A$$

is also true.

Then substituting 1 into 2:

$$3. \quad AA^* = A^*A$$

This shows that every Hermitian matrix is also a Normal matrix.