Comp Sci 880 HW1

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0.1 Question 1

What we want to do is to split the real part and the imaginary part, and then do calculation with only real entry but resulting complex effect.

Firstly we need to split the amplitude into two part. It is easy to check that the RHS also have 2-norm 1.

$$\begin{pmatrix} a + ci \\ b + di \\ 0 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} a \\ b \\ c \\ d \end{pmatrix}$$

To do this, we need a unitary matrix like this:

$$U = \begin{pmatrix} 1 \end{pmatrix}$$