Answer on Question #43817 – Math – Linear Algebra

Question:

Show that the vectors (1-i,i) and (2,-I+i) in C^2 are Linearly Dependent over Field C but Linearly Independent over R , where i = √-1

Solution.

Two vectors v_1, v_2 are Linearly Dependent over field F if there exists scalar a in F such that

$$v_1 = av_2$$

In this case we have $v_2 = (1-i, i), \quad v_1 = (2, -1+i)$. It can be easily seen that a=(1+i).

Indeed $av = (1+i)(1-i, i) = (2, -1+i) = v_1$.

Hence, this vectors are linearly dependent over field C. But they are linearly independent over R, because $a = (1+i)$ doesn't belong to R.