Assignment-7

Satyam Singh
EE20MTECH14015

***Abstract*—This assignment deals with subspace of vector field.**

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https://github.com/satyam463/Assignment−7/blob/master/assignment%207.tex

1 Problem Statement

Verify that the set of complex numbers numbers described in the form of c where x and y are rational is a sub-field of C.

2 Solution

Lets consider the set S = $\{x + y\sqrt{2}, x, y \in Q\}$, $S \subset C$ We must verify that S meets the following two conditions:

$$0, 1 \in S \tag{2.0.1}$$

$$If a, b \in S, a + b, -a, ab, a^{-1} \in S \tag{2.0.2}$$

Throughout let

$$a = x + y\sqrt{2}, b = w + z\sqrt{2} \tag{2.0.3}$$

$$if x = 0 = y = 0 \in Q, a = 0 + \sqrt{2}.0 = 0, 0 \in S \tag{2.0.4}$$

$$if x = 1, y = 0, a = 1 + \sqrt{2}.0 = 1, 1 \in S \tag{2.0.5}$$

Hence 2.0.1 is verfied .

$$a + b = x + y\sqrt{2} + w + z\sqrt{2} = b + a \tag{2.0.6}$$

$$-a = -x - y\sqrt{2}, x, y \in Qso - x, -y \in Q, a \in S \tag{2.0.7}$$

$$ab = (x + y\sqrt{2})(w + z\sqrt{2}) = ba, ab \in S \tag{2.0.8}$$

$$a^{-1}a = (x + y\sqrt{2})^{-1}(x + y\sqrt{2}) = 1, a^{-1} \in S \tag{2.0.9}$$

Hence 2.0.2 is verfied . Therefore by considering the 2.0.1 and 2.0.2 we can say set complex numbers of given form $x + y\sqrt{2}$ is subfield of C .