

# Assignment-7

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

Download tex file from

<https://github.com/satyam463/Assignment-7/blob/master/assignment%207.tex>

5)

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

6)

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

## 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  $C$ .

Hence 2.0.1 ,2.0.2 is verified . 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  $C$  .

## 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:

$$0, 1 \in S \quad (2.0.1)$$

$$a, b \in S, a + b, -a, ab, a^{-1} \in S \quad (2.0.2)$$

Throughout let

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

If

1)

$$x = 0, y = 0 \in Q, a = 0 + \sqrt{2}.0 = 0, 0 \in S \quad (2.0.4)$$

2)

$$x = 1, y = 0, a = 1 + \sqrt{2}.0 = 1, 1 \in S \quad (2.0.5)$$

3)

$$a + b = x + y\sqrt{2} + w + z\sqrt{2} = b + a \quad (2.0.6)$$

4)

$$-a = -x - y\sqrt{2}, x, y \in Q \text{ so } -x, -y \in Q, a \in S \quad (2.0.7)$$