Math Document Template

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***Abstract*—This is a document explaining a question about the concept of multiplying two complex numbers using matrices.**

Download all python codes from

```
svn co https://github.com/chakki1234/summer
    −2020/trunk/linearalg/codes
```

and latex-tikz codes from

```
svn co https://github.com/chakki1234/summer
    −2020/trunk/linearalg/figs
```

1 Problem

Find $\begin{pmatrix} -\sqrt{3} \\ \sqrt{2} \end{pmatrix}\begin{pmatrix} 2\sqrt{3} \\ -1 \end{pmatrix}$

2 Solution

A complex number $\begin{pmatrix} a \\ b \end{pmatrix}$ can be represented as 2 x 2 matrix:

$$\begin{pmatrix} a & -b \\ b & a \end{pmatrix} \tag{2.0.1}$$

1) Multiplying the given matrices after converting them to a 2 x 2 matrix:

$$\begin{pmatrix} -\sqrt{3} & -\sqrt{2} \\ \sqrt{2} & -\sqrt{3} \end{pmatrix}\begin{pmatrix} 2\sqrt{3} & 1 \\ -1 & 2\sqrt{3} \end{pmatrix} \tag{2.0.2}$$

$$\begin{pmatrix} \sqrt{2}-6 & -\sqrt{3}-2\sqrt{6} \\ \sqrt{3}+2\sqrt{6} & \sqrt{2}-6 \end{pmatrix} \tag{2.0.3}$$

$$\tag{2.0.4}$$

2) Matrix 2.0.3 can be represented as a vector:

$$\therefore \begin{pmatrix} \sqrt{2}-6 \\ \sqrt{3}+2\sqrt{6} \end{pmatrix} \tag{2.0.5}$$

3) Python code to multiply two complex numbers:

```
codes/line_ex/complex_ex/complex_ex.py
```