Assignment 2

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1 Problem

[Matrices Q2; Q47]

If $A = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$, then find AB, BA.
Show that $AB \neq BA$.

2 Solution

Performing respective matrix multiplications,

$$AB = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \times \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \tag{2.0.1}$$

$$AB = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \tag{2.0.2}$$

Similarly,

$$BA = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \times \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \tag{2.0.3}$$

$$BA = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \tag{2.0.4}$$

$$\tag{2.0.5}$$

$$\therefore AB \neq BA \tag{2.0.6}$$