The matrix

1. $\begin{pmatrix} 3 & -3 \\ 2 & 0 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} 2 & -1 & 5 \\ 0 & 3 & -2 \end{pmatrix}$

$\begin{pmatrix} (6+0) & (-3+-9) & (15+6) \\ (4+0) & (-2+0) & (10+0) \\ (2+0) & (-1+12) & (5-8) \end{pmatrix}$

$\begin{pmatrix} 6 & -12 & 21 \\ 4 & -2 & 10 \\ 2 & 11 & -3 \end{pmatrix}$

2. $\begin{pmatrix} 2 & -1 \\ 3 & 5 \end{pmatrix} \begin{bmatrix} 5 & -3 \\ -1 & 0 \end{bmatrix}$

$\begin{pmatrix} (10+1) & (-6+0) \\ (15-5) & (-9+0) \end{pmatrix}$

$\begin{pmatrix} 11 & -6 \\ 10 & -9 \end{pmatrix}$

3. PQ

$$\begin{pmatrix} 2 & 3 & -1 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 5 \end{pmatrix}$$

$$\begin{pmatrix} 2+0+-5 \end{pmatrix} = \begin{pmatrix} -3 \end{pmatrix}$$

QP

$$\begin{pmatrix} 1 \\ 0 \\ 5 \end{pmatrix} \begin{pmatrix} 2 & 3 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 3 & -1 \\ 0 & 0 & 0 \\ 10 & 15 & -5 \end{pmatrix}$$

4. AB

$$\begin{pmatrix} 3 & -1 & 0 \\ -2 & 5 & 1 \end{pmatrix} \begin{pmatrix} 3 & 2 \\ 0 & -1 \end{pmatrix}$$

only BA can be calculated

$$\begin{pmatrix} 3 & 2 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} 3 & -1 & 0 \\ -2 & 5 & 1 \end{pmatrix}$$

$$\begin{pmatrix} (9+-4) & (-3+10) & (0+2) \\ (0+2) & (0-5) & (0-1) \end{pmatrix}$$

$$\begin{pmatrix} 5 & 7 & 2 \\ 2 & -5 & -1 \end{pmatrix}$$

1. This is not true. With matricies the answer will change as the multiplications are ~~different~~.

2. This is not true because we are multiplying them so each position could be perhaps 1-1 which will total to 0.

3. $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ As the 0 will stay and the others are multiplied an odd amount of times.

4. $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$