Worksheet 19

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1. Multiply the following matrices:

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

   b.
   $$\begin{pmatrix} 1 & 2 \\ 4 & 8 \end{pmatrix} \begin{pmatrix} 8 & -2 \\ -4 & 1 \end{pmatrix}$$

   Multiply the rows by the columns one by one:

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

   b.
   $$\begin{pmatrix} 1 & 2 \\ 4 & 8 \end{pmatrix} \begin{pmatrix} 8 & -2 \\ -4 & 1 \end{pmatrix} = \begin{pmatrix} 16 & 0 \\ 0 & 16 \end{pmatrix}$$

2. Find the transpose of the following matrices:

   a.
   $$\begin{pmatrix} 4 & 3 \\ 2 & 1 \end{pmatrix}$$

   b.
   $$\begin{pmatrix} 4 & 3 & 2 & 1 \\ 10 & 9 & 8 & 7 \end{pmatrix}$$

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

   a.
   $$\begin{pmatrix} 4 & 2 \\ 3 & 1 \end{pmatrix}$$

   b.
   $$\begin{pmatrix} 4 & 10 \\ 3 & 9 \\ 2 & 8 \\ 1 & 7 \end{pmatrix}$$

c.

$$\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$$

3. **True or false:** The product of an $n \times n$ matrix and a $n \times 1$ matrix is another $n \times 1$ matrix.

   This is **true**.