Help is legal.

1. Perform the indicated operations if \( A = \begin{bmatrix} 3 & t \\ -5 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 3 \\ -1 & s \end{bmatrix} \)

\[ A + 4B \]

\[ AB \]

\[ BA \]

Does \( AB = BA? \)
Find \((AB)^T\)

Find \(B^T A^T\)

Does equal \(? (AB)^T = B^T A^T\)
2. Matrix Product

The contents in grams per ounce of almonds, bread and cheese are shown.

<table>
<thead>
<tr>
<th></th>
<th>Protein</th>
<th>Fat</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almonds</td>
<td>6</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Bread</td>
<td>2</td>
<td>0.5</td>
<td>14</td>
</tr>
<tr>
<td>Cheese</td>
<td>7</td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>

The calories per gram of protein, fat and carbohydrate are 4, 9 and 4 respectively.

Write a product of 3 matrices to find the total calorie content in a meal consisting of
2 ounces of almonds, 3 ounces of bread and 1 ounce of cheese. You might want to start with
a product of two matrices showing the calories per ounce of each food.
3. Solve the matrix equation \( 2AX = B + 3X \) for \( X \) in general. (Write an equation in the form \( X = \underline{\phantom{00000}} \))

\[
\begin{bmatrix}
1 & 2 & -1 \\
1 & 0 & 1 \\
1 & 1 & 1
\end{bmatrix}
\begin{bmatrix}
X \\
Y \\
Z
\end{bmatrix}
\begin{bmatrix}
2 \\
3 \\
4
\end{bmatrix}
\]

Find \( X \) if \( A = \begin{bmatrix} 1 & 2 & -1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix} \), \( B = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix} \) and \( 2AX = B + 3X \)

4. An economy is based on three sectors, energy, agriculture and manufacturing. Production of a unit of energy uses up 0.2 of a unit of energy, 0.1 of a unit of agriculture, and 0.05 of a unit of manufacturing.

Production of a unit of agriculture uses 0.3 of a unit of energy, 0.4 of a unit of agriculture and 0.2 of a unit of manufacturing.

Production of a unit of manufacturing uses 0.25 of each sector.

How much of each sector must be produced to meet a demand for 10 million dollars of energy, 5 million dollars of agriculture and 7 million dollars of manufacturing.