Problems

1. Textbook Problems: 3.2.51, 3.2.52.

2. Textbook Problems: 3.3.3 to 3.3.10, 3.3.22, 3.3.26, 3.3.38 and 3.3.45.

3. Textbook Problems: 3.4.16, 3.4.22, 3.4.28, 3.4.30, 3.3.36.

4. a) Suppose \( A \in \mathbb{R}^{m \times n} \) is such that \( A + B = B \) for every \( B \in \mathbb{R}^{m \times n} \). Find \( A \).

   b) A matrix \( A \in \mathbb{R}^{m \times n} \) is said to be a zero matrix if all of its entries are zero. If \( B \in \mathbb{R}^{m \times n} \), what is \( A + B \)? \( B + A \)?

   c) Recall that if \( x, y \in \mathbb{R} \) are such that \( xy = 0 \), then either \( x = 0 \) or \( y = 0 \). However, matrix multiplication does not have this property. Give an example of two nonzero matrices \( A \) and \( B \) such that \( AB \) is a zero matrix.

5. Solve for \( x \), \( y \), \( z \) and \( w \):

\[
\begin{bmatrix}
  x & 4 \\
  4y & w
\end{bmatrix}
- \begin{bmatrix}
  4x & 2z \\
  -3 & -2w
\end{bmatrix}
= \begin{bmatrix}
  12 & 8 \\
  y & 6
\end{bmatrix}.
\]

6. Rewrite the matrix equation the following matrix equation as a linear system of linear equations:

\[
\begin{bmatrix}
  3 & 1 & 0 \\
  2 & -2 & 1 \\
  1 & 1 & 2
\end{bmatrix}
\begin{bmatrix}
  x \\
  y \\
  z
\end{bmatrix}
= \begin{bmatrix}
  4 \\
  9 \\
  2
\end{bmatrix}.
\]

Do NOT solve it.