1. Let
\[
    A = \begin{pmatrix}
        3 & 8 & -1 & 4 & -8 & -8 \\
        -11 & -3 & 5 & 8 & 2 & -4 \\
        -11 & 2 & -8 & -1 & 0 & 1 \\
        -7 & 3 & 0 & 0 & -1 & -4 \\
        -11 & -5 & -8 & -2 & 5 & -5 \\
        -11 & 1 & -8 & 6 & -10 & -1
    \end{pmatrix}
\quad \text{and} \quad
    B = \begin{pmatrix}
        -6 & -3 & 5 \\
        3 & -1 & 2 \\
        -2 & 0 & -2 \\
        5 & -3 & -4 \\
        -2 & 5 & -3 \\
        -6 & 2 & 4
    \end{pmatrix}
\]
Find the (3, 2) and (2, 3) entries of the product \( AB \).

2. Consider the linear map \( T : \mathbb{R}^3 \to \mathbb{R}^3 \) given by
\[
    T(x, y, z) = (x - 2y - 2z, 2x - 6y - 7z, -4x + 10y + 10z).
\]
(a) Express \( M(T) \) using the standard basis.
(b) Use the standard basis to find the matrix \( M(v) \) for the vector \( v = (-1, -2, 3) \) and compute \( M(T)M(v) \).
(c) Express \( M(T) \) using the basis \((1, 3, -2), (-4, -9, 10), (-2, -5, 5)\) (for both the domain and codomain).
(d) Use the basis \((1, 3, -2), (-4, -9, 10), (-2, -5, 5)\) to find the matrix \( M(v) \) for the vector \( v = (-1, -2, 3) \) and compute \( M(T)M(v) \).

3. Consider the identity linear map \( I : \mathbb{R}^3 \to \mathbb{R}^3 \).
(a) Find the matrix \( M(I) \) using the standard bases.
(b) Find the matrix \( M(I) \) using the basis \((1, 0, 3), (2, 1, 0), (3, 2, -2)\) for the domain and the standard basis for the codomain.
(c) Find the matrix \( M(I) \) using the standard basis for the domain and the basis \((1, 0, 3), (2, 1, 0), (3, 2, -2)\) for the codomain.
(d) Use the standard basis to find \( M(v) \) for the vector \( v = (1, 2, 3) \) and compute the product \( M(I)M(v) \) where \( M(I) \) is the matrix from the previous part. Interpret the result.

4. Consider the identity map \( I : \mathcal{P}_2 \to \mathcal{P}_2 \).
(a) Find the matrix \( M(I) \) using the bases \(1, x, x^2\) for the domain and \(1, 1 + x, (1 + x)^2\) for the codomain.
(b) Find the matrix \( M(I) \) using the bases \(1, 1 + x, (1 + x)^2\) for the domain and \(1, x, x^2\) for the codomain.