Name:

Solve **one** of the following two questions:

1. Let $T \in \mathcal{L}(U, V)$ and $S \in \mathcal{L}(V, W)$ be invertible linear maps. Prove that $ST \in \mathcal{L}(U, W)$ is invertible, and show that $(ST)^{1-} = T^{-1}S^{-1}$.

2. Let $T : \mathbb{R}^4 \to \mathbb{R}^3$ be given by

$$T(w, x, y, z) = (3w - 2x + z, x + 3y - 4z, w - x + y + z).$$

Compute the matrix of T with respect to the bases

$$B_4 = \{(1, 0, 2, 0), (0, 3, 0, 1), (1, -2, 0, 0), (0, 0, -1, 1)\} \text{ of } \mathbb{R}^4, \text{ and}$$
$$B_3 = \{(1, 0, 0), (0, 1, 0), (0, 0, 1)\} \text{ of } \mathbb{R}^3.$$