1. Let $S = \{v_1, v_2\}$ and $T = \{w_1, w_2\}$ be ordered bases for $\mathbb{R}_2$, where $v_1 = [1 \ 2]$ and $v_2 = [0 \ 1]$. If the transition matrix from $S$ to $T$ is \[
abla_{\begin{smallmatrix}2 & 1 \\ 1 & 1 \end{smallmatrix}}\], determine $T$.

2. Let $A$ and $B$ be $10 \times 10$ matrices with rank$A = 7$, and rank$B = 10$. Find the rank of $AB$. 