Tutorial 4

Problem 1 Let $\alpha = \{\mathbf{u}_1, \mathbf{u}_2\}$, $\beta = \{\mathbf{v}_1, \mathbf{v}_2\, \mathbf{v}_3\}$, and $\gamma = \{\mathbf{w}_1, \mathbf{w}_2\}$ be bases of vector spaces U, V, and W respectively. Let $S : U \longrightarrow V$ be defined by $S(\mathbf{u}_1) = \mathbf{v}_1 + \mathbf{v}_2 + \mathbf{v}_3$ and $S(\mathbf{u}_2) = -\mathbf{v}_1 + 2\mathbf{v}_2 - 3\mathbf{v}_3$. Let $T : V \longrightarrow W$ be defined by $T(\mathbf{v}_1) = \mathbf{w}_1 - \mathbf{w}_2$, $T(\mathbf{v}_2) = 2\mathbf{w}_1 + \mathbf{w}_2$, and $T(\mathbf{v}_3) = \mathbf{w}_1 - 2\mathbf{w}_2$

(a) Find TS.
(b) Compute $TS(2\mathbf{u}_1 + 3\mathbf{u}_2)$.
(c) Is TS invertible? Then find $(TS)^{-1}$.