① Let $\varphi \ R^{\infty} \rightarrow R^{\infty}$

$\varphi(a_1, a_2 \cdots a_n \cdots) = (a_1, a_1+a_2, a_1+a_2+a_3, \cdots\cdots)$

is φ a lineer transformation? If it is find $\ker(\varphi)$ and $R(\varphi)$.

2) Prove that there is no lineer transformation $T \ R^2 \rightarrow R$ that is 1-1

3) Let $T \ V \rightarrow W$ a lineer transformation and suppose that V is not finite dimensional. Prove that $\ker(T)$ and $\text{Range}(W)$ cannot be both finite dimensional.

Give examples of lineer transformations T_1 & T_2 where $\ker(T_1)$ is finitite dimensional and $\text{Range}(T_2)$ is finite dimensional

6) Let U V W be finite dimensional vector spaces on F

$Hom(V, W) = \{ S : V \to W \mid S$ is a linear transf $\}$

$Hom(V, W)$ is a vector space on F

Let T $V \to W$ be a linear transformation

Show that the set of real transformations

α $U \to V$ s.t $T \circ \alpha = 0$ is a subspace of $Hom(V, W)$

and find its dimension