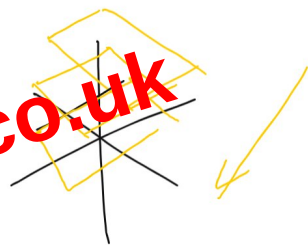


$$V/U = \{v+U : v \in V\}$$

( $U \subset V$ )



stack of all  
subsets parallel  
to  $U$

$$\pi : V \rightarrow V/U, \quad \pi(\vec{v}) \rightarrow \vec{v} + U$$

affine space

vector space

$$T \in \mathcal{L}(V, W) \quad \tilde{T} : V/\text{null}(T) \rightarrow W$$

$$\vec{v} \in V \rightarrow \tilde{T}(\vec{v} + \text{null}(T)) := \left( T \vec{v} \right) = T(\vec{v} + \vec{n}) \quad \begin{matrix} \downarrow \\ \in \text{null}(T) \end{matrix} \quad \text{b/c} \quad T(\vec{n}) = 0$$

3.91 (2) Show that  $\tilde{T}$  is injective & surjective onto  $\text{range}(T)$   
 $\Rightarrow \tilde{T}$  is an isomorphism from  $V/\text{null}(T)$  to  $\text{range}(T)$  !