

Proof :

▶ Since  $V/U$  is finite dimensional,  
there exists basis of  $V/U$ ,

$$v_1 + U, \dots, v_m + U$$

$$\text{s.t. } v_1, \dots, v_m \notin U$$

▶ Thus given any  $v \in V$ ,

$$v + U = a_1(v_1 + U) + \dots + a_m(v_m + U)$$

$$= (a_1 v_1 + \dots + a_m v_m) + U$$

$$\Rightarrow v - (a_1 v_1 + \dots + a_m v_m) \in U$$

by 3.85

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