We now figure out:

- how to find a basis for a T-cyclic subspace of V
- what the matrix of T looks like in this basis

Theorem (cf 5.22(a))

Let V be a vector space, $T: V \to V$ be a linear map and W be a T-cyclic subspace of V generated by $v \in V$.

Suppose that $\dim W = k$. Then

$$\beta = \{v, T(v), \ldots, T^{k-1}(v)\}$$

is a basis for W

Proof: Idea: a largest-possible LI set is a basis

so:

let j be the largest integer such that

$\{v, T(v), \ldots, T^{j-1}(v)\}$ is LI.