

The linear transformation  $T : V \rightarrow V$  is injective if and only if zero is not an eigenvalue of  $T$ .

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The linear transformation  $T : V \rightarrow V$  is injective if and only if  $T(v) = 0$  iff  $v = 0$ , i.e. if and only if  $T$  has no eigenvectors with eigenvalue 0.