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invariant subspace

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Let  $T : V \rightarrow V$  be a linear transformation of a vector space  $V$ . A subspace  $U \subset V$  is called a *T-invariant subspace* if  $T(u) \in U$  for all  $u \in U$ .

If  $U$  is an invariant subspace, then the restriction of  $T$  to  $U$  gives a well defined linear transformation of  $U$ . Furthermore, suppose that  $V$  is  $n$ -dimensional and that  $v_1, \dots, v_n$  is a basis of  $V$  with the first  $m$  vectors giving a basis of  $U$ . Then, the representing matrix of the transformation  $T$  relative to this basis takes the form

$$\begin{pmatrix} A & B \\ 0 & C \end{pmatrix}$$

where  $A$  is an  $m \times m$  matrix representing the restriction transformation  $T|_U : U \rightarrow U$  relative to the basis  $v_1, \dots, v_m$ .