example Suppose that $\beta = \{v_1, \dots, v_a, w_1, \dots, w_b, \dots, z_1, \dots, z_c\}$ is ~~the~~ a basis with respect to which $[T]_\beta^\beta$ is in Jordan canonical form:

$$[T]_\beta^\beta = \begin{array}{c} \\ a \\ b \\ \vdots \\ c \end{array} \begin{array}{cccc} a & b & \cdots & c \\ \multicolumn{4}{c}{\left(\begin{array}{c|c|c|c} A_1 & 0 & 0 & 0 \\ \hline 0 & A_2 & 0 & 0 \\ \hline 0 & 0 & \ddots & 0 \\ \hline 0 & 0 & 0 & A_k \end{array}\right)} \end{array}$$

Then the "first block" span $\{v_1, \dots, v_a\}$ is T-invariant: if $v = \alpha_1 v_1 + \dots + \alpha_a v_a$ then

$$[T(v)]_\beta = [T]_\beta^\beta [v]_\beta$$

$$= \begin{array}{c} \\ a \end{array} \begin{array}{c} a \\ \left(\begin{array}{c|c|c|c} A_1 & 0 & 0 & 0 \\ \hline 0 & A_2 & 0 & 0 \\ \hline 0 & 0 & \ddots & 0 \\ \hline 0 & 0 & 0 & A_k \end{array}\right) \end{array} \begin{pmatrix} \alpha_1 \\ \vdots \\ \alpha_a \\ 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix}$$

$$= \begin{pmatrix} A_1 v \\ \hline 0 \\ 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix}$$

vector of size a

rest are zeroes