

This means that

(2)

$$[T]_{\beta}^{\beta} = \begin{pmatrix} A_1 & 0 & 0 & 0 \\ \hline 0 & A_2 & 0 & 0 \\ 0 & 0 & \ddots & 0 \\ \hline 0 & 0 & 0 & A_k \end{pmatrix}$$

where each matrix  $A_i$  is either  
a  $1 \times 1$  matrix  $(\lambda)$  or takes the form

$$\begin{pmatrix} \lambda & 1 & 0 & \dots & 0 \\ 0 & \lambda & 1 & \dots & 0 \\ 0 & 0 & \lambda & \dots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \dots & \lambda \end{pmatrix}$$

The matrices  $A_i$  are called Jordan blocks.

Better still, the Jordan form of a transformation  $T: V \rightarrow V$  is unique apart from the fact that one could re-order the Jordan blocks  $A_1, \dots, A_k$ .

Note that the basis  $\beta$  is not unique, but any Jordan canonical basis  $\beta$  gives the same Jordan canonical form (up to re-ordering).