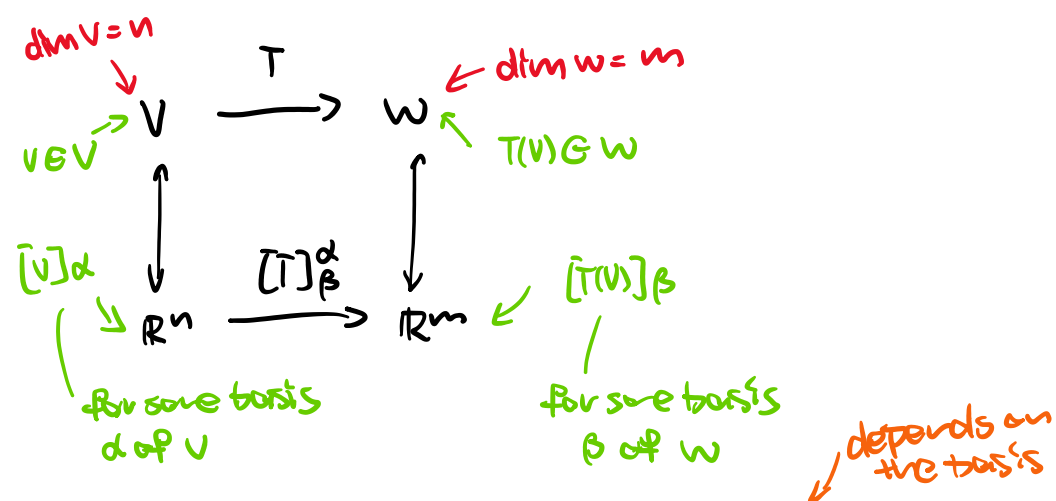


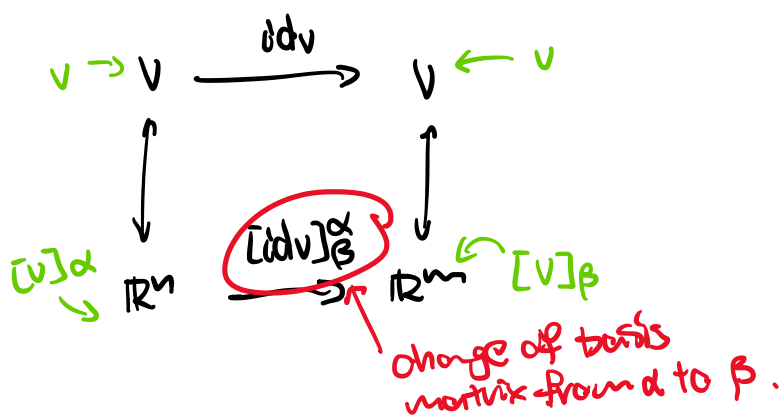
Review_of_matrix_representation_and_change_of_coordinates

Thursday, June 17, 2021

11:11



In particular, change of basis \leftarrow coordinate changes for the same vector.



That is

$$[v]_\beta = [Id_V]_\beta^\alpha [v]_\alpha$$

\uparrow we know how to find matrix rep in general !!

Example: Find the change of coordinate matrix that changes the coordinate in the basis $1, 1+t$ in $P_1(\mathbb{R})$ to the coordinate in the basis $1-t, 2t$ in $P_1(\mathbb{R})$

Q: $\alpha = (1, 1+t), \beta = (1-t, 2t)$

$$[Id_{P_1(\mathbb{R})}]_\beta^\alpha = \begin{bmatrix} | & | \\ [Id(1)]_\beta & [Id(1+t)]_\beta \\ | & | \end{bmatrix}$$

by def of matrix representation.

$$= \begin{bmatrix} | & | \\ [1]_\beta & [1+t]_\beta \\ | & | \end{bmatrix}$$

notice $1 = 1 \cdot (1-t) + \frac{1}{2} (2t)$, so $[1]_\beta = \begin{pmatrix} 1 \\ \frac{1}{2} \end{pmatrix}$

$1+t = 1 \cdot (1-t) + 1 \cdot (2t)$, so $[1+t]_\beta = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

so $\begin{pmatrix} 1 & 1 \\ \frac{1}{2} & 1 \end{pmatrix}$ is the change of coordinate matrix from α to β \square