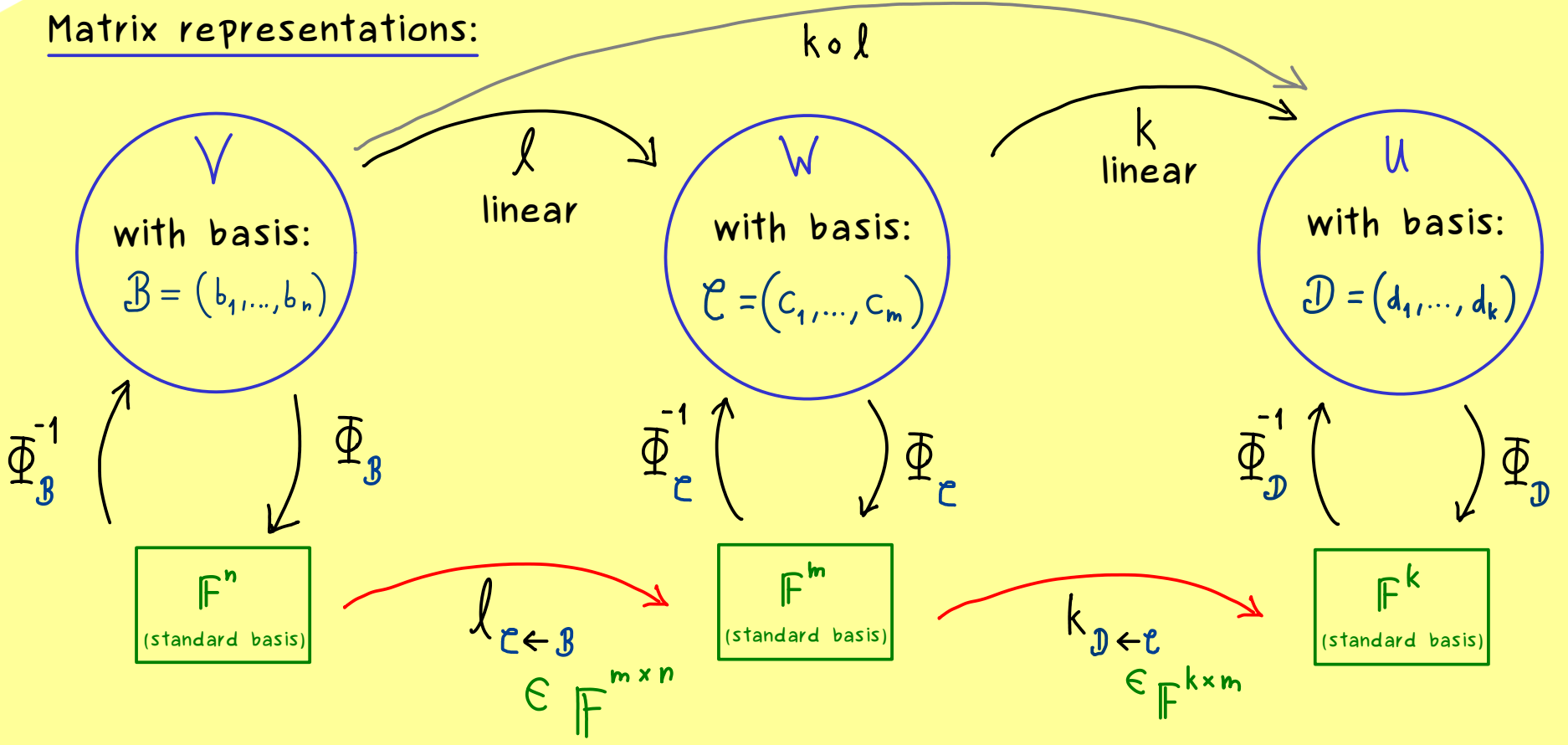




Abstract Linear Algebra - Part 26

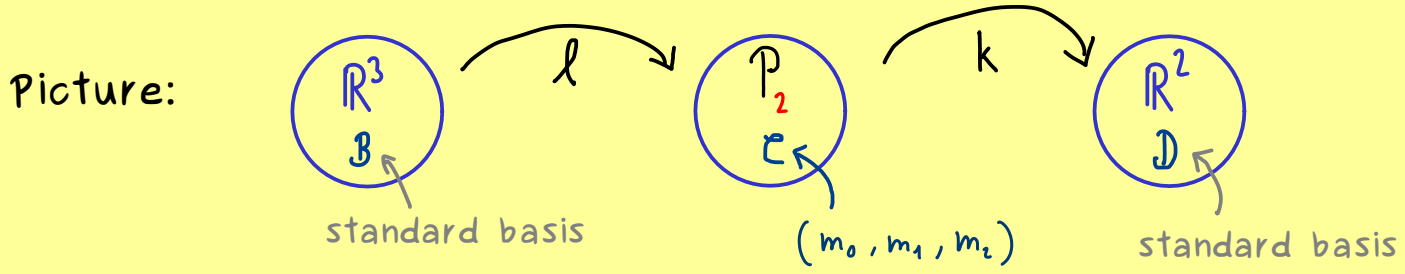
Matrix representations:



We get: $(k \circ l)_{D \leftarrow B} = k_{D \leftarrow C} l_{C \leftarrow B}$ (matrix product)

Example: $l: \mathbb{R}^3 \rightarrow \mathcal{P}_2(\mathbb{R})$, $\begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix} \mapsto (v_1 + v_2 + v_3) \cdot m_0 + (v_1 + v_2) \cdot m_1 + v_1 \cdot m_2$
 with $m_0: x \mapsto 1$, $m_k: x \mapsto x^k$

$k: \mathcal{P}_2(\mathbb{R}) \rightarrow \mathbb{R}^2$, $p \mapsto \begin{pmatrix} p'(1) \\ p(1) - p''(1) \end{pmatrix}$



$(k \circ l)_{D \leftarrow B} = ?$

$$l_{C \leftarrow B} = \begin{pmatrix} \Phi_C(l(b_1)) & \Phi_C(l(b_2)) & \Phi_C(l(b_3)) \end{pmatrix} = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$$

$$k_{D \leftarrow C} = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 1 & -1 \end{pmatrix}$$

$(k \circ l)_{D \leftarrow B} = k_{D \leftarrow C} l_{C \leftarrow B} = \begin{pmatrix} 3 & 1 & 0 \\ 1 & 2 & 1 \end{pmatrix}$

Corollary: $(l^{-1})_{B \leftarrow C} = (l_{C \leftarrow B})^{-1}$ $n = m$

