

$$(2) D: P_3(\mathbb{R}) \rightarrow P_2(\mathbb{R})$$

$$\delta = (1, x, x^2) \quad \delta = (1, x, x^2)$$

$$[D]_{\delta} = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 3 \end{pmatrix}$$

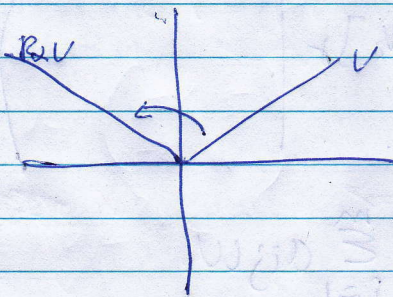
$$D1 = 0$$

$$Dx = 1$$

$$Dx^2 = 2x$$

$$Dx^3 = 3x^2$$

$$(3) R_{\alpha}: \mathbb{R}^2 \rightarrow \mathbb{R}^2$$

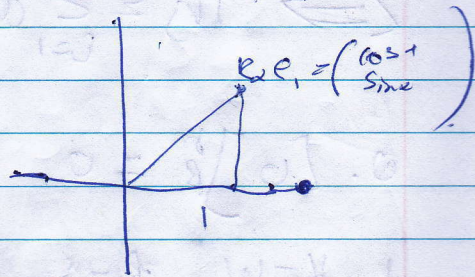


$$R_{\alpha} e_1 = (\cos \alpha) e_1 + (\sin \alpha) e_2$$

$$R_{\alpha} e_2 = (-\sin \alpha) e_1 + (\cos \alpha) e_1$$

$$B = \delta = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} e_1 \\ e_2 \end{pmatrix}$$

$$[R_{\alpha}] = \begin{pmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{pmatrix}$$



$$(4) A = \begin{pmatrix} a_{11} & \dots & a_{1n} \\ \vdots & & \vdots \\ a_{m1} & \dots & a_{mn} \end{pmatrix} \quad T_A: F^n \rightarrow F^m$$

$$T_A \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix} = \begin{pmatrix} a_{11}x_1 + a_{12}x_2 + \dots + a_{1n}x_n \\ \vdots \\ a_{m1}x_1 + \dots + a_{mn}x_n \end{pmatrix}$$

$$T_A \begin{pmatrix} 1 \\ 0 \\ \vdots \\ 0 \end{pmatrix} = \begin{pmatrix} a_{11} \\ \vdots \\ a_{m1} \end{pmatrix} = a_{11}e_1 + \dots + a_{m1}e_m$$

$$[T_A]_{e_i} = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix}$$