矩阵及其运算——矩阵的基本运算

知识点巩固练习

- $1. A + (-A) = \emptyset$

- 4. 一般情形下,矩阵乘法不满足交换律.
- 5. $A_{m \times n} O_{n \times s} = O_{m \times s};$ $O_{l \times m} A_{m \times n} = O_{t \times n}.$ 6. $A_{m \times n} E_n = A_{m \times n};$ $E_m A_{m \times n} = A_{l \times n}.$

$$O_{t \times m} A_{m \times n} = O_{t \times n}$$

练习题

1. 计算下列乘积:

(2) (x_1, x_2, x_3) $\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$;

$$= (\chi_1 a_{11} + \chi_2 a_{21} + \chi_3 a_{31}, \chi_1 a_{12} + \chi_2 a_{22} + \chi_3 a_{32}, \chi_1 a_{31} + \chi_2 a_{23} + \chi_3 a_{33}) \begin{pmatrix} \chi_1 \\ \chi_2 \\ \chi_3 \end{pmatrix}$$

$$\begin{array}{c|c}
3 & & \\
1 & & \\
3 & 1 \\
1 & (1, 1, 1)
\end{array}$$

$$(4) (1, 1, 1) \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}.$$

2. 已知两个线性变换
$$\begin{cases} x_1 = 2y_1 + y_3, \\ x_2 = -2y_1 + 3y_2 + 2y_3, \\ x_3 = 4y_1 + y_2 + 5y_3, \\ x_3 = 4y_1 + y_2 + 5y_3, \end{cases}$$
 求从 z_1, z_2, z_3 到 z_1, x_2, x_3 的线性变换(用矩阵乘法形式表示).
$$\begin{pmatrix} 2 & 0 & 1 \\ -2 & 3 & 2 \\ 4 & 1 & 5 \end{pmatrix} \begin{pmatrix} -3 & 0 & 0 \\ 2 & 0 & 1 \\ 0 & -1 & 3 \end{pmatrix} = \begin{pmatrix} -6 & -1 & 3 \\ 12 & -4 & 9 \\ -2 & -1 & 16 \end{pmatrix}$$

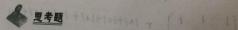
3. 已知
$$A = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$
, $B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 1 \\ 3 & 0 & 1 \end{bmatrix}$, 求(1) $(A+B)(A-B)$; (2) $A^2 - B^2$; (3) 由此题你能得出什么

即将可以点了物点还附针旋转中自加敏旋转变换

$$(A+B)(A-B) = \begin{pmatrix} 2 & 0 & 3 \\ 0 & 4 & 2 \\ 3 & 0 & 2 \end{pmatrix} \begin{pmatrix} 0 & 0 & 3 \\ 0 & 0 & 0 \\ -3 & 0 & 0 \end{pmatrix} = \begin{pmatrix} -9 & 0 & 6 \\ -6 & 0 & 0 \\ -6 & 0 & 9 \end{pmatrix}$$

$$A^{2}-B^{2} = \begin{pmatrix} 1 & 0 & 6 \\ 0 & 4 & 3 \\ 0 & 0 & 1 \end{pmatrix} - \begin{pmatrix} 1 & 0 & 0 \\ 3 & 4 & 3 \\ 6 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 6 \\ -3 & 0 & 0 \\ -6 & 0 & 0 \end{pmatrix}$$

矩阵过算不满足平为差公式 100



矩阵 $\begin{pmatrix} \cos \varphi & -\sin \varphi \\ \sin \varphi & \cos \varphi \end{pmatrix}$ 对应的线性变换 $\begin{cases} x_1 = x \cos \varphi - y \sin \varphi \\ y_1 = x \sin \varphi + y \cos \varphi \end{cases}$ 有什么几何意义?

ic xoy平面上向量 op=(x)

则线性变换即将可变为可=(分)

设可发力r.辐角98

刚 X= rose- y= rsmo

14 . .. $x_1 = r \cos \theta \cos \varphi - r \sin \theta \sin \varphi = r \cos (\theta + \varphi)$ y, = r 650 sing + r 54 0 659 = r sin(4+0)