$L$ - лин. п-во над $\mathbb{R}$, $\dim(L) = 4$; (1)

$e_1, e_2, e_3, e_4$ - базис п-ва $L$.

$$A = \begin{pmatrix} 1 & 0 & 2 & -1 \\ 0 & 1 & 4 & -2 \\ 2 & -1 & 0 & 1 \\ 2 & -1 & -1 & 2 \end{pmatrix}$$

$$\begin{vmatrix} 1-\lambda & 0 & 2 & -1 \\ 0 & 1-\lambda & 4 & -2 \\ 2 & -1 & -\lambda & 1 \\ 2 & -1 & -1 & 2-\lambda \end{vmatrix} =$$

$$\begin{vmatrix} 1-\lambda & 0 & 2 & -1 \\ -2(1-\lambda) & 1-\lambda & 0 & 0 \\ 3-\lambda & -1 & 2-\lambda & 0 \\ 2+(1-\lambda)(2-\lambda) & -1 & -1+2(2-\lambda) & 0 \end{vmatrix} =$$

$$(1-\lambda)\begin{vmatrix} -2 & 1 & 0 \\ 3-\lambda & -1 & 2-\lambda \\ 2+(1-\lambda)(2-\lambda) & -1 & -1+2(2-\lambda) \end{vmatrix} =$$

$$(1-\lambda)\begin{vmatrix} -2 & 1 & 0 \\ 1-\lambda & 0 & 2-\lambda \\ (1-\lambda)(2-\lambda) & 0 & -1+2(2-\lambda) \end{vmatrix} =$$

(2)

$$-(1-\lambda)^2 \begin{vmatrix} 1 & 2-\lambda \\ 2-\lambda & -1+2(2-\lambda) \end{vmatrix} =$$

$$-(1-\lambda)^2 \left( -1 + 2(2-\lambda) - (2-\lambda)^2 \right) =$$

$$-(1-\lambda)^2 \left( -1 + (2-\lambda)(2-2+\lambda) \right) =$$

$$-(1-\lambda)^2 \left( -1 + 2\lambda - \lambda^2 \right) = (\lambda - 1)^{\underline{4}}$$

$$\lambda = 1, \quad m = \underline{4} .$$

$$\boxed{\cancel{\lambda = 1, \ m = 4}}$$

$$\begin{pmatrix} 0 & 0 & 2 & -1 \\ 0 & 0 & 4 & -2 \\ 2 & -1 & -1 & 1 \\ 2 & -1 & -1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 0 & 2 & -\underline{1} \\ 2 & -1 & -1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 0 & 2 & -1 \\ 2 & -1 & 1 & 0 \end{pmatrix}$$

$$\begin{array}{cccc} ② & ④ & ① & ③ \\ \end{array}$$
$$\left(\begin{array}{cc|cc} 0 & -1 & 0 & -2 \\ -\underline{1} & 0 & -2 & -1 \end{array}\right) \qquad x^1 = c^1, \quad x^3 = c^2.$$

(1) $c^1 = 1,\ c^2 = 0;\ x^1 = 1,\ x^3 = 0$

$x^2 = 2,\ x^4 = 0.\qquad e_1 = \begin{pmatrix} 1 \\ 2 \\ 0 \\ 0 \end{pmatrix}$

(2) $c^1 = 0,\ c^2 = 1;\ x^1 = 0,\ x^3 = 1$

$x^2 = 1,\ x^4 = 2.\qquad e_2 = \begin{pmatrix} 0 \\ 1 \\ 1 \\ 2 \end{pmatrix}.$

$(A - \lambda I)^2 =$

$$\begin{pmatrix} 0 & 0 & 2 & -1 \\ 0 & 0 & 4 & -2 \\ 2 & -1 & -1 & 1 \\ 2 & -1 & -1 & 1 \end{pmatrix} \begin{pmatrix} 0 & 0 & 2 & -1 \\ 0 & 0 & 4 & -2 \\ 2 & -1 & -1 & 1 \\ 2 & -1 & -1 & 1 \end{pmatrix} =$$

$$\begin{pmatrix} 2 & -1 & -1 & 1 \\ 4 & -2 & -2 & 2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \qquad \begin{pmatrix} 2 & -1 & -1 & 1 \end{pmatrix}$$

$$\begin{array}{cccc} 4 & 1 & 2 & 3 \\ \multicolumn{4}{c}{\left(\begin{array}{c|ccc} 1 & -2 & 1 & 1 \end{array}\right)} \end{array} \quad x^1 = c^1,\ x^2 = c^2,\ x^3 = c^3.$$

(1) $c^1 = 1,\ c^2 = 0,\ c^3 = 0;\ x^1 = 1,\ x^2 = 0,\ x^3 = 0,$

$x^4 = -2 \qquad e_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \\ -2 \end{pmatrix}.\quad (A - \lambda I)e_1 = \begin{pmatrix} 2 \\ 4 \\ 0 \\ 0 \end{pmatrix}.$

(2) $c^1 = 0,\ c^2 = 1,\ c^3 = 0;\ x^1 = 0,\ x^2 = 1,\ x^3 = 0,$

$x^4 = 1 \qquad e_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 1 \end{pmatrix}.\quad (A - \lambda I)e_2 = \begin{pmatrix} -1 \\ -2 \\ 0 \\ 0 \end{pmatrix}.$

(3) $c^1 = 0,\ c^2 = 0,\ c^3 = 1$;

$x^1 = 0,\ x^2 = 0,\ x^3 = 1,\ x^4 = 1$

$$e_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 1 \end{pmatrix} \qquad (A - \lambda I)\, e_3 = \begin{pmatrix} 1 \\ 2 \\ 0 \\ 0 \end{pmatrix}.$$

$Q_3 = 2$;

$$e_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix},\quad e_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix},\quad e_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix},\quad e_4 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

$$(A - \lambda I)^2 e_1 = \begin{pmatrix} 2 \\ 4 \\ 0 \\ 0 \end{pmatrix} \qquad (A - \lambda I)^2 e_2 = \begin{pmatrix} -1 \\ -2 \\ 0 \\ 0 \end{pmatrix}$$

$$(A - \lambda I)^2 e_3 = \begin{pmatrix} -1 \\ -2 \\ 0 \\ 0 \end{pmatrix} \qquad (A - \lambda I)^2 e_4 = \begin{pmatrix} 1 \\ 2 \\ 0 \\ 0 \end{pmatrix}$$

$$\left(\begin{array}{cccc|ccc|cc} 2 & -1 & -1 & 1 & 2 & -1 & 1 & 1 & 0 \\ 4 & -2 & -2 & 2 & 4 & -2 & 2 & 2 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 \end{array}\right)$$

Итак:

$$\left(\begin{array}{c|c} 1 & 0 \\ 2 & 1 \\ 0 & 1 \\ 0 & 2 \end{array}\right) \qquad (A - \lambda I)\, e_4 = \begin{pmatrix} -1 \\ -2 \\ 1 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 \\ 2 \\ 0 \\ 0 \end{pmatrix},\ \begin{pmatrix} -1 \\ -2 \\ 1 \\ 1 \end{pmatrix},\ \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix};\ \begin{pmatrix} 0 \\ 1 \\ 1 \\ 2 \end{pmatrix} \qquad \begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

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$L$ - лин. п-во над $\mathbb{R}$, $\dim(L) = 4$;

$e_1, e_2, e_3, e_4$ - базис п-ва $L$.

$$A = \begin{pmatrix} 1 & 1 & 1 & 0 \\ -1 & 3 & 0 & 1 \\ -1 & 0 & -1 & 1 \\ 0 & -1 & -1 & 1 \end{pmatrix}$$

$$\begin{vmatrix} 1-\lambda & 1 & 1 & 0 \\ -1 & 3-\lambda & 0 & 1 \\ -1 & 0 & -1-\lambda & 1 \\ 0 & -1 & -1 & 1-\lambda \end{vmatrix} =$$

$$\begin{vmatrix} 1-\lambda & 1 & 1 & 0 \\ -1 & 3-\lambda & 0 & 1 \\ -\lambda^2 & 1+\lambda & 0 & 1 \\ 1-\lambda & 0 & 0 & 1-\lambda \end{vmatrix} =$$

$$(1-\lambda)\begin{vmatrix} -1 & 3-\lambda & 1 \\ -\lambda^2 & 1+\lambda & 1 \\ 1 & 0 & 1 \end{vmatrix} =$$

$$(1-\lambda)\begin{vmatrix} -1 & 3-\lambda & 1 \\ 1-\lambda^2 & -2+2\lambda & 0 \\ 2 & -3+\lambda & 0 \end{vmatrix} =$$

$$(1-\lambda)^2 \begin{vmatrix} 1+\lambda & -2 \\ 2 & -3+\lambda \end{vmatrix} =$$

$$(1-\lambda)^2\left(-3+\lambda-3\lambda+\lambda^2+4\right) = (1-\lambda)^2(\lambda^2-2\lambda+1) =$$

$$(\lambda-1)^4$$

$\lambda = 1$, $m = \underline{4}$.

$$\begin{pmatrix} 0 & 1 & 1 & 0 \\ -1 & 2 & 0 & 1 \\ -1 & 0 & -2 & 1 \\ 0 & -1 & -1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 1 & 1 & 0 \\ -1 & 0 & -2 & 1 \\ -1 & 0 & -2 & \underline{1} \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{array}{cccc} ② & ④ & ① & ③ \\ \end{array}$$
$$\left(\begin{array}{cc|cc} 1 & 0 & 0 & -1 \\ 0 & 1 & 1 & 2 \end{array}\right)$$

$x^1 = c^1$, $x^3 = c^2$

(1) $c^1 = 1$, $c^2 = 0$;

$x^1 = 1$, $x^3 = 0$,

$x^2 = 0$, $x^4 = 1$

$$e_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

(2) $c^1 = 0$, $c^2 = 1$; $x^1 = 0$, $x^3 = 1$, $x^2 = -1$,

$x^4 = 2$

$$e_2 = \begin{pmatrix} 0 \\ -1 \\ 1 \\ 2 \end{pmatrix}$$

$(A - \lambda I)^2 =$

$$\begin{pmatrix} 0 & 1 & 1 & 0 \\ -1 & 2 & 0 & 1 \\ -1 & 0 & -2 & 1 \\ 0 & -1 & -1 & 0 \end{pmatrix} \begin{pmatrix} 0 & 1 & 1 & 0 \\ -1 & 2 & 0 & 1 \\ -1 & 0 & -2 & 1 \\ 0 & -1 & -1 & 0 \end{pmatrix} =$$

$$\begin{pmatrix} -2 & 2 & -2 & 2 \\ -2 & 2 & -2 & 2 \\ 2 & -2 & 2 & -2 \\ 2 & -2 & 2 & -2 \end{pmatrix}$$

$x^2 = c^1, \ x^3 = c^2,$

$x^4 = c^3.$

$(1 \quad -1 \quad 1 \quad -1)$

$$\begin{array}{cccc} ① & ② & ③ & ④ \end{array}$$
$(1 \mid 1 \quad -1 \quad 1)$

(1) $c^1 = 1, \ c^2 = 0, \ c^3 = 0;$

$x^2 = 1, \ x^3 = 0, \ x^4 = 0,$

$x^1 = 1$ $\quad e_1 = \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix}$

(2) $c^1 = 0, \ c^2 = 1, \ c^3 = 0; \ x^2 = 0, \ x^3 = 1, \ x^4 = 0,$

$x^1 = -1.$ $\quad e_2 = \begin{pmatrix} -1 \\ 0 \\ 1 \\ 0 \end{pmatrix}$

(3) $c^1 = 0, \ c^2 = 0, \ c^3 = 1; \ x^2 = 0, \ x^3 = 0, \ x^4 = 1, \ x^1 = 1$

$e_3 = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix}$ $\quad (A - \lambda I) e_1 = \begin{pmatrix} 1 \\ 1 \\ -1 \\ -1 \end{pmatrix}$ $\quad (A - \lambda I) e_2 = \begin{pmatrix} 1 \\ 1 \\ -1 \\ -1 \end{pmatrix}$

$(A - \lambda I) e_3 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}.$

$$Q_3 = L;$$

$$e_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \quad e_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix}, \quad e_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}, \quad e_4 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

$$(A - \lambda I)^2 e_1 = \begin{pmatrix} -2 \\ -2 \\ 2 \\ 2 \end{pmatrix} \qquad (A - \lambda I)^2 e_2 = \begin{pmatrix} 2 \\ 2 \\ -2 \\ -2 \end{pmatrix}$$

$$(A - \lambda I)^2 e_3 = \begin{pmatrix} -2 \\ -2 \\ 2 \\ 2 \end{pmatrix} \qquad (A - \lambda I)^2 e_4 = \begin{pmatrix} 2 \\ 2 \\ -2 \\ -2 \end{pmatrix}$$

$$\left(\begin{array}{cccc|ccc|cc} -2 & 2 & -2 & 2 & 1 & 1 & 0 & 1 & 0 \\ -2 & 2 & -2 & 2 & 1 & 1 & 0 & 0 & -1 \\ 2 & -2 & 2 & -2 & -1 & -1 & 0 & 0 & 1 \\ 2 & -2 & 2 & -2 & -1 & -1 & 0 & 1 & 2 \end{array}\right)$$

$$\left(\begin{array}{c|c} 2 & 1 \\ 2 & 0 \\ -2 & 0 \\ -2 & 1 \end{array}\right) \qquad (A - \lambda I) e_4 = \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix}$$

Итак:

$$\begin{pmatrix} 2 \\ 2 \\ -2 \\ -2 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix}; \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}.$$

$L$ - лин. п-во над $\mathbb{R}$, $\dim(L) = 4$; (5)

$e_1, e_2, e_3, e_4$ - базис п-ва $L$.

$$A = \begin{pmatrix} 3 & -4 & 0 & 2 \\ 4 & -5 & -2 & 4 \\ 0 & 0 & 3 & -2 \\ 0 & 0 & 2 & -1 \end{pmatrix}$$

$$\begin{vmatrix} 3-\lambda & -4 & 0 & 2 \\ 4 & -5-\lambda & -2 & 4 \\ 0 & 0 & 3-\lambda & -2 \\ 0 & 0 & 2 & -1-\lambda \end{vmatrix} =$$

$$\begin{vmatrix} 3-\lambda & -4 \\ 4 & -5-\lambda \end{vmatrix} \cdot \begin{vmatrix} 3-\lambda & -2 \\ 2 & -1-\lambda \end{vmatrix} =$$

$$(-15 - 3\lambda + 5\lambda + \lambda^2 + 16)(-3 - 3\lambda + \lambda + \lambda^2 + 4) =$$

$$(\lambda^2 + 2\lambda + 1)(\lambda^2 - 2\lambda + 1) = (\lambda - 1)^2 (\lambda + 1)^2$$

$\lambda = -1$ $\qquad$ $\lambda = 1$

$m = 2$ $\qquad$ $m = 2$.

$\underline{\lambda = -1, \ m = 2.}$

$$\begin{pmatrix} 4 & -4 & 0 & 2 \\ 4 & -4 & -2 & 4 \\ 0 & 0 & 4 & -2 \\ 0 & 0 & 2 & 0 \end{pmatrix}$$

(6)

$$\begin{pmatrix} 2 & -2 & 0 & 1 \\ 2 & -2 & -1 & 2 \\ 0 & 0 & 2 & -1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 & -2 & 0 & 1 \\ 0 & 0 & -1 & 1 \\ 0 & 0 & 2 & -1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 & -2 & 0 & 1 \\ 0 & 0 & -1 & 1 \\ 0 & 0 & 1 & 0 \\ \cancel{0} & \cancel{0} & \cancel{1} & \cancel{0} \end{pmatrix}$$

$$\begin{pmatrix} 2 & -2 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 & -2 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$$\begin{array}{cccc} 1 & 3 & 4 & 2 \\ \end{array}$$
$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{array}\right)$$

$x^2 = C$

$C = 1$ ; $x^2 = 1$

$x^1 = 1$, $x^3 = 0$, $x^4 = 0$

$$e = \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix}.$$

$(A - \lambda I)^2 =$

$$\begin{pmatrix} 4 & -4 & 0 & 2 \\ 4 & -4 & -2 & 4 \\ 0 & 0 & 4 & -2 \\ 0 & 0 & 2 & 0 \end{pmatrix} \begin{pmatrix} 4 & -4 & 0 & 2 \\ 4 & -4 & -2 & 4 \\ 0 & 0 & 4 & -2 \\ 0 & 0 & 2 & 0 \end{pmatrix} =$$

$$\begin{pmatrix} 0 & 0 & 12 & -8 \\ 0 & 0 & 8 & -4 \\ 0 & 0 & 12 & -8 \\ 0 & 0 & 8 & -4 \end{pmatrix}$$

$$\begin{array}{cccc} ③ & ④ & ① & ② \end{array}$$
$$\left(\begin{array}{cc|cc} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{array}\right)$$

$x^1 = c^1, \; x^2 = c^2$

$$\begin{pmatrix} 0 & 0 & 3 & -2 \\ 0 & 0 & 2 & -1 \end{pmatrix}$$

(1) $c^1 = 1, \; c^2 = 0;$

$x^1 = 1, \; x^2 = 0, \; x^3 = 0,$

$x^4 = 0. \quad e_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}$

$$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & 0 & 2 & -1 \end{pmatrix}$$

(2) $c^1 = 0, \; c^2 = 1;$

$$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$$

$x^1 = 0, \; x^2 = 1, \; x^3 = 0,$

$x^4 = 0 \quad e_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix}.$

$$(A - \lambda I) e_1 = \begin{pmatrix} 4 \\ 4 \\ 0 \\ 0 \end{pmatrix} \qquad (A - \lambda I) e_2 = \begin{pmatrix} -4 \\ -4 \\ 0 \\ 0 \end{pmatrix}.$$

$$\begin{pmatrix} 4 \\ 4 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}. \qquad \left(\begin{array}{cc|c} 4 & -4 & 1 \\ 4 & -4 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{array}\right) \qquad \begin{pmatrix} 4 \\ 4 \\ 0 \\ 0 \end{pmatrix}$$

$\lambda = 1$ , $m = 2$

$$\begin{pmatrix} 2 & -4 & 0 & 2 \\ 4 & -6 & -2 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & 0 & 2 & -2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -2 & 0 & 1 \\ 2 & -3 & -1 & 2 \\ 0 & 0 & 1 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -2 & 0 & 1 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 1 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -2 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \end{pmatrix}$$

$$\begin{array}{cccc} 1 & 2 & 3 & 4 \\ \end{array}$$
$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{array}\right) \qquad x^4 = C$$

$C = 1$; $x^4 = 1$, $x^1 = 1$, $x^2 = 1$, $x^3 = 1$ $\quad e = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$.

$(A-\lambda I)^2 =$

$$\begin{pmatrix} 2 & -4 & 0 & 2 \\ 4 & -6 & -2 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & 0 & 2 & -2 \end{pmatrix}\begin{pmatrix} 2 & -4 & 0 & 2 \\ 4 & -6 & -2 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & 0 & 2 & -2 \end{pmatrix} =$$

$$\begin{pmatrix} -12 & 16 & 12 & -16 \\ -16 & 20 & 16 & -20 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{array}{cccc} 1 & 2 & 3 & 4 \end{array}$$
$$\left(\begin{array}{cc|cc} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{array}\right)$$

$x^3 = c^1, \quad x^4 = c^2$

$$\begin{pmatrix} -3 & 4 & 3 & -4 \\ -4 & 5 & 4 & -5 \end{pmatrix}$$

(1) $c^1 = 1, \quad c^2 = 0;$

$x^3 = 1, \quad x^4 = 0$

$x^1 = 1, \quad x^2 = 0$

$$\begin{pmatrix} -3 & 4 & 3 & -4 \\ 0 & -1 & 0 & 1 \end{pmatrix}$$

$$e_1 = \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} -3 & 0 & 3 & 0 \\ 0 & -1 & 0 & 1 \end{pmatrix}$$

(2) $c^1 = 0, \quad c^2 = 1;$

$x^3 = 0, \quad x^4 = 1,$

$$\begin{pmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 0 & -1 \end{pmatrix}$$

$x^1 = 0, \quad x^2 = 1$

$$e_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 1 \end{pmatrix}$$

$$(A-\lambda I)e_1 = \begin{pmatrix} 2 \\ 2 \\ 2 \\ 2 \end{pmatrix}$$

$$(A-\lambda I)e_2 = \begin{pmatrix} -2 \\ -2 \\ -2 \\ -2 \end{pmatrix}$$

$$\begin{pmatrix} 2 \\ 2 \\ 2 \\ 2 \end{pmatrix}, \quad \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix}.$$

$$\left(\begin{array}{cc|c} 2 & -2 & 1 \\ 2 & -2 & 1 \\ 2 & -2 & 1 \\ 2 & -2 & 1 \end{array}\right) \quad \begin{pmatrix} 2 \\ 2 \\ 2 \\ 2 \end{pmatrix}$$

Итак: (10)

$$\begin{pmatrix}4\\4\\0\\0\end{pmatrix}, \begin{pmatrix}1\\0\\0\\0\end{pmatrix}; \begin{pmatrix}2\\2\\2\\2\end{pmatrix}, \begin{pmatrix}1\\0\\1\\0\end{pmatrix}$$

$$\begin{pmatrix}-1 & 1 & 0 & 0\\ 0 & -1 & 0 & 0\\ 0 & 0 & 1 & 1\\ 0 & 0 & 0 & 1\end{pmatrix}.$$