$$\left(\begin{array}{cccc|c} 4 & -10 & 5 & -5 \\ 2 & -14 & 7 & -7 \\ 1 & 0 & 0 & 0 \end{array}\right)^{-2} \sim \begin{pmatrix} 1 & 0 & 0 & 0 \\ 2 & -14 & 7 & -7 \\ 4 & -10 & 5 & -5 \end{pmatrix} \to \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -14 & 7 & -7 \\ 4 & -10 & 5 & -5 \end{pmatrix} \to \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -14 & 7 & -7 \\ 0 & -10 & 5 & -5 \end{pmatrix} \to$$

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

$$\left\{\begin{array}{l} x_1 = 0 \\ -2x_2 + x_3 - x_4 = 0 \end{array}\right. \qquad \left\{\begin{array}{l} x_1 = 0 \\ x_2 = -\frac{x_3}{2} + \frac{x_4}{2} \end{array}\right.$$

$x_3,\ x_4 - c\,б$

Общее: $\left(0;\ \underbrace{x_3 - \tfrac{1}{2}x_4}\ ;\ x_3;\ x_4\right)$

$n - r = 4 - 2 = 2$

$X_1 -$

$X_2 - -\frac{1}{2}X_3 + \frac{1}{2}X$

$X_1 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ \ldots \end{pmatrix}$

Пусть $x_3 = 0$, $x_4 = 2$

$x_2 = 1$

$\sqrt{1}$ $x_3 = 2$ $x_1 = 0$

$x_2 = -1$

$X_2 = \begin{pmatrix} 0 \\ -1 \\ 2 \\ 0 \end{pmatrix}$

Ф.С.Р.:

$X = C_1 X_1 + C_2 \cdot X_2 = C_1 \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} + C_2 \cdot \begin{pmatrix} 0 \\ -1 \\ 2 \\ 0 \end{pmatrix}$

N2 $\bar{A}(\vec{x}) = [\vec{x}, \vec{a}]$

1) $A(v + w) = A(v) + A(w)$

2) $\bar{A}(\lambda \cdot v) = \lambda A(v)$

1) $\ddot{A}(\vec{x} + \vec{y}) = [\vec{x} + \vec{y}, a] = [\vec{x}, \vec{a}] + [\vec{y}, \vec{a}] = \bar{A}(\vec{x}) + A(\vec{y})$

2) $A(\lambda x) = [\lambda \vec{x}, \vec{a}] = \lambda \cdot [\vec{x}, \vec{a}] = \lambda \cdot \bar{A}(\vec{x})$

$\vec{A}(\vec{x}) = 2\vec{x}$

1) $\vec{A}(\vec{x}+\vec{y}) = 2\cdot\vec{x} + 2\vec{y} = \vec{A}(\vec{x}) + \vec{A}(\vec{y})$

2) $\vec{A}(\vec{x}\cdot\lambda) = 2x\cdot\lambda = \lambda\cdot\vec{A}(\vec{x})$

$\vec{a} = 1\vec{i} + 1\vec{k}$ $\quad \vec{i}, \vec{j}, \vec{k} - 1.6$

$\vec{x} = x_1\vec{i} + x_2\vec{j} + x_3\vec{k}$

$\bar{A}(\vec{x}) = [\vec{x}, \vec{a}] = \begin{vmatrix} i & j & k \\ x_1 & x_2 & x_3 \\ 1 & 0 & 1 \end{vmatrix} = \begin{vmatrix} i\, x_2 + j(x_3 - x_1) \end{vmatrix} i - k\, x_2$

$$A = \begin{array}{c} x_1 \\ x_2 \\ x_3 \end{array} \begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 1 & 0 & \end{pmatrix}$$

N 5 $\bar{A}(p(t)) = p(t) - 2\cdot p(t)$

$P_2 \to (t^2, t, 1)$

$P_3 \to (t^3, t^2, t, 1)$

$$P(t) = At^2 + Bt + C$$

$$A(p(t)) = (At^2 + Bt + C)' - 2(At^2 + Bt + C)' =$$

$$= (2At + B) + (2At^2 + B2t + 2C) =$$

$$= (A + B)2t + 2At^2 + 2C + B - \underline{2At^2 + (2A + 2B)t + B + 2C}$$

$$\bar{A} = \begin{array}{c} \\ A \\ B \\ C \end{array} \begin{pmatrix} 2 & 2 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 2 & 0 \end{pmatrix} \quad A$$

$$\begin{pmatrix} 0 & 2 & 1 \\ 0 & 0 & 2 \end{pmatrix} \cdot \begin{pmatrix} B \\ C \end{pmatrix} =$$

$$\begin{cases} 2A + 2B = 0 & t^2 \\ 2B + C = & t \\ 2C = 0 & 1 \end{cases} \qquad \begin{cases} A = 0 \\ B = 0 \\ C = 0 \end{cases}$$

$$p(t) = At^2 + Bt + C$$

$$p(t) = 2t^2 + t$$

$$\mathrm{Ker}A(p(t)) = \{p(t) = 0\}$$

$$\begin{pmatrix} 2 & 2 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{pmatrix} \cdot \begin{pmatrix} A \\ B \\ C \end{pmatrix} = A\begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix} + B\begin{pmatrix} 2 \\ 2 \\ 0 \end{pmatrix} + C\begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix}$$

$$\mathrm{Im}\bar{A} = \{p(t) - (2A + 2B)t^2 + (2B + C)t - 2C\}$$

$$\mathrm{Im}\bar{A} = P_2$$

$\mathbb{N}^{\circ}$ $G = \begin{pmatrix} g_{11} & g_{12} \\ g_{21} & g_{22} \end{pmatrix} - \begin{pmatrix} |e_1|^2 & e_1 \cdot e_2 \\ e_1 \cdot e_2 & |e_2|^2 \end{pmatrix}$

$\begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}$ $\quad |\vec{e}_1| = \sqrt{2}$ $\quad e_1 \cdot e_2 - 1$

$|\vec{e}_2| - \sqrt{3}$

$\vec{x} = 1 \cdot \vec{e}_1 - 1\vec{e}_2$

$\vec{y} = 1 \cdot \vec{e}_1 + 1\vec{e}_2$

$\vec{x} - \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad \vec{y} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

$\cos\angle(\vec{x}, \vec{y}) = \dfrac{(\vec{x}, \vec{y})}{|\vec{x}| \cdot |\vec{y}|}$

$|\vec{x}|^2 - \vec{x}' \quad \vec{x} - \begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} - \begin{pmatrix} 1 & -2 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix}$

$= 3$

$|\vec x| = \sqrt{3}$

$|\vec y|^2 = \vec y^T G \vec y = (3\ 4) \cdot \begin{pmatrix}1\\1\end{pmatrix} = 7$

$|\vec y| = \sqrt{7}$

$(\vec x, \vec y) = \vec x^T G \vec y = (1\ \ -2) \cdot \begin{pmatrix}1\\1\end{pmatrix} =$

$= -1$

$\cos\angle(\vec x, \vec y) = \dfrac{-1}{\sqrt{3} \cdot \sqrt{7}} = -\dfrac{1}{\sqrt{21}}$

$$\angle(\vec{x}, \vec{y}) = \arccos\left(\frac{1}{\sqrt{21}}\right) = \pi - \arccos\frac{1}{\sqrt{2}}$$