

$$A = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 1 \end{pmatrix}, \quad b = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$$

$$x_0 = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \quad r_0 = Ax_0 - b = \begin{pmatrix} -1 \\ 0 \\ -1 \end{pmatrix}, \quad p_0 = r_0$$

$$\lambda_0 = \frac{(r_0, p_0)}{(Ap_0, p_0)} = \frac{2}{3}$$

$$x_1 = x_0 - \lambda_0 \cdot p_0 = \begin{pmatrix} 2/3 \\ 0 \\ 1/3 \end{pmatrix}$$

$$r_1 = Ax_1 - b = \begin{pmatrix} 1/3 \\ -4/3 \\ -1/3 \end{pmatrix}$$

$$p_1 = r_1 - \mu_0 p_0, \quad \mu_0 = \frac{(Ap_0, r_1)}{(Ap_0, p_0)} = -1$$

$$= \begin{pmatrix} -2/3 \\ -4/3 \\ -4/3 \end{pmatrix}$$

$$x_2 = x_1 - \lambda_1 \cdot p_1, \quad \lambda_1 = \frac{(p_1, p_1)}{(Ap_1, p_1)} = 2.25$$

$$= \begin{pmatrix} 13/6 \\ 3 \\ 11/3 \end{pmatrix}$$

$$r_2 = Ax_2 - b = \begin{pmatrix} 1/3 \\ 1/6 \\ -1/3 \end{pmatrix}$$

$$p_2 = r_2 - \mu_1 \cdot p_1, \quad \mu_1 = \frac{(Ap_1, r_2)}{(Ap_1, p_1)} = -0.125$$

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

$$x_3 = x_2 - \lambda_2 \cdot p_2, \quad \lambda_2 = \frac{(p_2, r_2)}{(Ap_2, p_2)} = \frac{2}{3}$$

$$= \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}$$

$$r_3 = Ax_3 - b = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$