

Name: **due to Apr 7**

Excercise: Use the projection to find the best approximate solution \mathbf{x}' of the system $\mathbf{Ax} = \mathbf{b}$, where

$$\mathbf{A} = \begin{pmatrix} 3 & 2 & -1 & 1 & 3 \\ 3 & 1 & 3 & -1 & -2 \\ 2 & -3 & -1 & -1 & -1 \\ 1 & -1 & -2 & -3 & 1 \\ 1 & -3 & 1 & 3 & 1 \\ 1 & 1 & -3 & 2 & -3 \end{pmatrix}, \quad \mathbf{b} = (26, 5, 34, -18, -30, -13)^T$$

Determine the error $\|\mathbf{Ax}' - \mathbf{b}\|$.

Observe that the columns of \mathbf{A} are mutually perpendicular.

Excercise: Calculate

Varianta 1:

$$\begin{vmatrix} 10 & 10 & 10 & \dots & & & \dots & 10 & 10 & 10 \\ 0 & 9 & 9 & \dots & & & \dots & 9 & 9 & 0 \\ 0 & 0 & 8 & \dots & & & \dots & 8 & 0 & 0 \\ \vdots & & \ddots & \ddots & & & \ddots & \ddots & & \vdots \\ & & & 0 & 2 & 2 & 2 & 0 & & \\ & & & 0 & 0 & 1 & 0 & 0 & & \\ & & & 0 & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} & 0 & & \\ \vdots & & \ddots & \ddots & & & \ddots & \ddots & & \vdots \\ 0 & 0 & -\frac{1}{8} & \dots & & & \dots & \frac{1}{8} & 0 & 0 \\ 0 & -\frac{1}{9} & \frac{1}{9} & \dots & & & \dots & \frac{1}{9} & \frac{1}{9} & 0 \\ -\frac{1}{10} & \frac{1}{10} & \frac{1}{10} & \dots & & & \dots & \frac{1}{10} & \frac{1}{10} & \frac{1}{10} \end{vmatrix}$$

Excercise: Prove that for a block matrix $\begin{pmatrix} \mathbf{A} & \mathbf{0} \\ \mathbf{C} & \mathbf{B} \end{pmatrix}$ where \mathbf{A} and \mathbf{B} are square matrices of possibly different orders and \mathbf{C} is a rectangular matrix holds that: $\det \begin{pmatrix} \mathbf{A} & \mathbf{0} \\ \mathbf{C} & \mathbf{B} \end{pmatrix} = \det(\mathbf{A}) \det(\mathbf{B})$.