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SIA 372.6 - Mathematics
Hwrk 1
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P4, $A=\begin{bmatrix}3&-1&2\\1&0&3\\3&-2&-5\end{bmatrix}$ $B=\begin{bmatrix}3&-6&-3\\7&-14&-7\\-1&2&1\end{bmatrix}$

$$AB=\begin{bmatrix}9-7-2 & -18+14+4 & -9+7+2\\ 3+0-3 & -6+0+6 & -3+0-3\\ 9-14+5 & -18+28-10 & -9+14-5\end{bmatrix}=\begin{bmatrix}0&0&0\\0&0&0\\0&0&0\end{bmatrix}$$

$$BA=\begin{bmatrix}9-6-9 & -3+0+6 & 6-18+15\\ 21-14-21 & -7+0+14 & 14-42+35\\ -3+2+3 & 1+0-2 & -2+6-5\end{bmatrix}=\begin{bmatrix}-6&3&3\\-14&7&7\\2&-1&-1\end{bmatrix}\neq 0=AB$$

P5, let M_1, M_2, Hi, P_0 be the \$value loaned out per loan type and R be bank's revenue such that: in \$millions.

$$R=0.14M_1+0.2M_2+0.2Hi+0.1P_0$$

constraints:

① $M_1+M_2+Hi+P_0=250$

② $M_1=0.55(M_1+M_2) \Rightarrow 0.55M_2-0.45M_1=0$

③ $M_2=0.25(250) \Rightarrow M_2=62.5$

④ $0.15=R/250 \Rightarrow R=37.5$

⑤ $M_1, M_2, Hi, P_0 \geq 0$

①-⑤ $\Rightarrow$ $\begin{bmatrix}1&1&1&1\\-0.45&0.55&0&0\\0&1&0&0\\0.14&0.2&0.2&0.1\end{bmatrix}\begin{bmatrix}M_1\\M_2\\Hi\\P_0\end{bmatrix}=\begin{bmatrix}250\\0\\62.5\\37.5\end{bmatrix}$

let $A=A$ $\quad x=x$ $\quad b=b$

$\Rightarrow Ax=b \Rightarrow A^{-1}Ax=A^{-1}b \Rightarrow Ix=A^{-1}b$

$\Rightarrow x=A^{-1}b \Rightarrow \begin{bmatrix}M_1\\M_2\\Hi\\P_0\end{bmatrix}=\begin{bmatrix}76.39\\62.50\\31.94\\79.17\end{bmatrix}$ in \$millions