hisobo Gaussian Elimination

$x = -930/155$

$1x + 1y + 14z = -5 \quad (1) \quad -2 \quad 5$

$= -\frac{86}{31}$

$2x + 1y - 11z = -6 \quad (2)$

$-5x + 1y + 9z = 12 \quad (3)$

Forward Elimination

(1) as before

$y = -\frac{191}{155}$

(2') $-y - 39z = 4$

(3') $6y + 79z = -13$

backward substitution

(1)

(2')

(3'') $-155z = 11 \rightarrow z = -\frac{11}{155}$

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pivot

$$\underbrace{\left(\begin{array}{ccc|c} 1 & 1 & 14 & -5 \\ 2 & 1 & -11 & -6 \\ -5 & 1 & 9 & 12 \end{array}\right)}_{A \qquad\qquad b}$$

"augmented matrix"

-2 $\quad$ 5 $\quad$ multipliers

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -5 & 6 & 1 \end{array}\right)$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 14 & -5 \\ 0 & -1 & -39 & 4 \\ 0 & 6 & 79 & -13 \end{array}\right) \quad 6$$

fix ?

$$\left(\begin{array}{ccc|c} 1 & 1 & 14 & -5 \\ 0 & -1 & -39 & 4 \\ 0 & 0 & -155 & 11 \end{array}\right) \rightarrow (1)$$

"reduction to upper triangular form"

backward elimination

$z = -\frac{11}{155}$ $\qquad -y + \frac{429}{155} = \frac{620}{155}$ $\qquad y = -\frac{191}{155}$

$x - \frac{191}{155} - \frac{154}{155} = -\frac{5 \times 155}{155} \rightarrow x = -\frac{88}{31}$

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$$L = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -5 & -6 & 1 \end{pmatrix} \quad U = \begin{pmatrix} 1 & 1 & 14 \\ 0 & -1 & -39 \\ 0 & 0 & -155 \end{pmatrix}$$

$$LU = \begin{pmatrix} 1 & 1 & 14 \\ 2 & 1 & -11 \\ -5 & 1 & 9 \end{pmatrix} = A$$

$$A(BC) = (AB)C$$

LU ~ theorem

subroutine "decomp" solution

$$A \longrightarrow L, U \qquad \vec{b}, L, U \longrightarrow \vec{x}$$

subroutine "solve"

$$L(U\vec{x}) = \vec{b}$$ solve for $\vec{b}^*$

$$L\vec{b}^* = \vec{b} \longrightarrow$$

$$U\vec{x} = \vec{b}^* \rightarrow$$ solve for $\vec{x}$

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Not lecture:

$y = -\sqrt[3]{x^3 - 6x^2}$ large x $y \sim -x$

O.A.?? $y' \to \lim_{x \to \pm\infty} -1$ $m = -1$

$b = \lim_{x \to \infty} -\sqrt[3]{x^3 - 6x^2} + x$ $x = \frac{1}{u}$

$= \lim_{u \to 0} -\sqrt[3]{\frac{1}{u^3} - 6\frac{1}{u^2}} + \frac{1}{u}$

$= \lim_{u \to 0} \frac{-\sqrt[3]{1 - 6u} + 1}{u} \to$ L'Hopital

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$$y = -\sqrt[3]{x^3 - 6x^2} \qquad \varepsilon = -\frac{6}{x}$$

$$= -x\sqrt[3]{1 - \frac{6}{x}}$$

MK $\sqrt[3]{1+\varepsilon} = 1 + \frac{1}{3}\varepsilon + O(\varepsilon^2)$

$$y = -x\left[1 - \frac{2}{x} + O\left(\frac{1}{x^2}\right)\right]$$

$$= -x + 2 + O\left(\frac{1}{x}\right)$$

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