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# Linear Algebra Homework 2

Hoon Hong

## ▼ LU Decomposition (LUD)

LU decomposition of A

$$A = \begin{bmatrix} 2 & -1 \\ -4 & -1 \end{bmatrix}$$

LU decomposition of A

$$A = \begin{bmatrix} 3 & 4 \\ -6 & -10 \end{bmatrix}$$

LU decomposition of A

$$A = \begin{bmatrix} 2 & 4 & -1 \\ -6 & -15 & 5 \\ 8 & 22 & -10 \end{bmatrix}$$

LU decomposition of A

$$A = \begin{bmatrix} 3 & 1 & -2 \\ -6 & -3 & 5 \\ 9 & 7 & -8 \end{bmatrix}$$

LU decomposition of A

$$A = \begin{bmatrix} 2 & -1 & 2 & -4 \\ 4 & -5 & 5 & -12 \\ 2 & 8 & -5 & 5 \\ -8 & 16 & 4 & 40 \end{bmatrix}$$

LU decomposition of A

$$A = \begin{bmatrix} -1 & 4 & -3 & -4 \\ -4 & 20 & -16 & -12 \\ -2 & 24 & -23 & 7 \\ 1 & 4 & -8 & 13 \end{bmatrix}$$



## ▼ Cholesky Decomposition (CD)

Cholesky decomposition of S

$$S = \begin{bmatrix} 16 & 8 \\ 8 & 20 \end{bmatrix}$$

Cholesky decomposition of S

$$S = \begin{bmatrix} 4 & -2 \\ -2 & 10 \end{bmatrix}$$

Cholesky decomposition of  $S$

$$S = \begin{bmatrix} 4 & 4 & -6 \\ 4 & 20 & 10 \\ -6 & 10 & 29 \end{bmatrix}$$

Cholesky decomposition of S

$$S = \begin{bmatrix} 4 & -6 & 8 \\ -6 & 13 & -16 \\ 8 & -16 & 36 \end{bmatrix}$$

Cholesky decomposition of S

$$S = \begin{bmatrix} 4 & 8 & -6 & 6 \\ 8 & 17 & -14 & 14 \\ -6 & -14 & 17 & -5 \\ 6 & 14 & -5 & 38 \end{bmatrix}$$

Cholesky decomposition of S

$$S = \begin{bmatrix} 16 & -8 & -4 & -4 \\ -8 & 13 & -4 & 8 \\ -4 & -4 & 6 & -7 \\ -4 & 8 & -7 & 25 \end{bmatrix}$$

## ▼ QR Decomposition (QRD)

QR decomposition of A

$$A = \begin{bmatrix} 14 & -6 \\ 14 & -9 \\ 7 & -6 \end{bmatrix}$$

QR decomposition of A

$$A = \begin{bmatrix} -10 & -6 & 29 \\ -10 & -21 & 5 \\ 5 & 18 & 5 \end{bmatrix}$$



QR decomposition of A

$$A = \begin{bmatrix} -9 & 9 & 4 \\ -9 & -3 & 12 \\ -9 & -3 & 10 \\ -9 & 9 & 6 \end{bmatrix}$$

QR decomposition of A

$$A = \begin{bmatrix} -3 & -8 & -9 \\ -3 & -10 & 15 \\ -3 & -8 & 7 \\ -3 & -10 & -1 \end{bmatrix}$$

QR decomposition of A

$$A = \begin{bmatrix} -2 & -18 & -2 & -2 \\ 0 & 0 & 0 & 10 \\ 0 & 0 & 14 & 10 \\ 0 & 14 & -12 & -14 \end{bmatrix}$$

QR decomposition of A

$$A = \begin{bmatrix} 8 & -18 & -12 & -12 \\ 0 & 0 & 0 & 16 \\ 0 & 0 & -8 & 8 \\ 0 & 12 & 6 & -14 \end{bmatrix}$$

## ▼ Eigen Decomposition (ED)

Eigen decomposition of A

$$A = \begin{bmatrix} -1 & 6 \\ -2 & 6 \end{bmatrix}$$

Eigen decomposition of A

$$A = \begin{bmatrix} -2 & -2 \\ 2 & 3 \end{bmatrix}$$

Eigen decomposition of A

$$A = \begin{bmatrix} 2 & 3 & -3 \\ -2 & -1 & 2 \\ 2 & 4 & -3 \end{bmatrix}$$

Eigen decomposition of A

$$A = \begin{bmatrix} -1 & 4 & -2 \\ -1 & 3 & -1 \\ -3 & 3 & -1 \end{bmatrix}$$



Eigen decomposition of A

$$A = \begin{bmatrix} 3 & 2 & 2 \\ -1 & -4 & 2 \\ -2 & -2 & -1 \end{bmatrix}$$

## ▼ Singular Value Decomposition (SVD)

Singular value decomposition of A

$$A = \begin{bmatrix} 8 & 6 \\ 3 & -4 \end{bmatrix}$$

Singular value decomposition of A

$$A = \begin{bmatrix} 18 & 26 \\ 18 & 1 \\ -27 & -14 \end{bmatrix}$$

Singular value decomposition of A

$$A = \begin{bmatrix} 6 & 6 & 3 \\ -1 & 2 & -2 \\ 4 & -2 & -4 \end{bmatrix}$$

Singular value decomposition of A

$$A = \begin{bmatrix} 18 & 1 \\ 18 & 1 \\ 6 & 17 \\ -6 & -17 \end{bmatrix}$$

Singular value decomposition of A

$$A = \begin{bmatrix} 11 & 8 & 2 \\ 13 & 4 & -2 \\ 3 & 12 & -6 \\ -5 & -8 & 10 \end{bmatrix}$$

Singular value decomposition of A

$$A = \begin{bmatrix} 5 & 5 & 5 & 5 \\ -3 & 3 & 3 & -3 \\ -2 & 2 & -2 & 2 \\ 1 & 1 & -1 & -1 \end{bmatrix}$$