

# COL 726 Homework III

K LAXMAN

TOTAL POINTS

35 / 95

## QUESTION 1

1 0 / 10

- ff - 0 pts Correct Algorithm and runs in  $O(n^2)$  time.
- ff - 5 pts No Details of Conversion to Hessenberg Matrix using Householder Transformations
- ff - 2 pts Missing Details in the Algorithm (Conversion to Hessenberg Matrix using Householder Transformations)
- ! - 10 pts *No Attempt*

## QUESTION 2

2 0 / 15

- ff - 0 pts (a) Correct
- ff - 2 pts (a) Does not take errors due to Floating Point Operations into Account
- ff - 3 pts (a) Details Missing
- ff - 5 pts (a) No Attempt
- ff - 0 pts (b) Correct
- ff - 1 pts (b) Minor Details Missing
- ff - 2 pts (b) Ignores the Errors due to Floating Point Computation of  $\tilde{b}$
- ff - 2 pts (b) Incomplete Proof
- ff - 5 pts (b) No Attempt
- ff - 0 pts (c) Correct
- ff - 2 pts (c) Incomplete Proof
- ff - 5 pts (c) No Attempt
- ! - 15 pts *Incorrect/No Attempt*

## QUESTION 3

3 6 / 15

- ! - 0 pts *Correct*
- ff - 15 pts Incorrect
- ff - 9 pts Implementation
- ! - 6 pts *Reasoning*
- ff - 3 pts generate data function
- ff - 4.5 pts Solving using Cholesky function
- ff - 4.5 pts Solving using QR decomposition
- ff - 3 pts Function to analyze error for reasoning
- ff - 3 pts Reasoning after analyzation is incorrect / not given
- 3 *Point adjustment*
- you should give QR code here
- also.....+3 after confirmation of this

## QUESTION 4

4 9 / 15

- ff - 0 pts Correct
- ff - 15 pts Incorrect
- ff - 5 pts has not done converse proof
- ff - 5 pts has not done forward proof
- ff - 5 pts part b not done (similar to a)
- ff - 7 pts Proper mathematical proof not given
- ff - 8 pts not said about schur / any other relevant method/not said about some decomposition; not said about diagonality; ambiguous partially correct answer /

⚡ - 7 pts Assumption not justified / Reasons not mentioned / Partially correct Answer  
- 6 Point adjustment

missing details.....b converse missing

#### QUESTION 5

5 0 / 10

⚡ - 0 pts Correct Proof (Shows that

$$\frac{w}{\|w\|} \sim$$

$$\frac{\tilde{w}}{\|\tilde{w}\|} \quad \text{for efforts}$$

! - 10 pts No Attempt

⚡ - 7 pts Incomplete Proof

⚡ - 3 pts Incorrect/Incomplete Proof: Doesn't take into account that the condition number of A is large (as the smallest eigenvalue is much smaller than other eigenvalues).

⚡ - 2 pts Details Missing

#### QUESTION 6

6 10 / 10

! - 0 pts Correct Proof (Shows that all eigenvalues are distinct by showing that  $GM(\lambda) = 1$ )

⚡ - 10 pts No Attempt

⚡ - 7 pts Incomplete Proof

#### QUESTION 7

7 10 / 10

! - 0 pts Correct

⚡ - 5 pts Incomplete/Incorrect "if" Proof

⚡ - 5 pts Incomplete/Incorrect "only if" Proof

#### QUESTION 8

8 0 / 10

⚡ - 0 pts Correct

! - 10 pts Incorrect

⚡ - 5 pts original solution and answer analysis not given

⚡ - 5 pts random noise not added for modification

⚡ - 8 pts Implementation not given but idea is correct

⚡ - 4 pts missing reasons / explanation of code / answers

1 0 / 10

€ - 0 pts Correct Algorithm and runs in  $O(n^2)$  time.

€ - 5 pts No Details of Conversion to Hessenberg Matrix using Householder Transformations

€ - 2 pts Missing Details in the Algorithm (Conversion to Hessenberg Matrix using Householder Transformations)

! - 10 pts *No Attempt*

20 / 15

ff - 0 pts (a) Correct

ff - 2 pts (a) Does not take errors due to Floating Point Operations into Account

ff - 3 pts (a) Details Missing

ff - 5 pts (a) No Attempt

ff - 0 pts (b) Correct

ff - 1 pts (b) Minor Details Missing

ff - 2 pts (b) Ignores the Errors due to Floating Point Computation of  $\tilde{b}$

ff - 2 pts (b) Incomplete Proof

ff - 5 pts (b) No Attempt

ff - 0 pts (c) Correct

ff - 2 pts (c) Incomplete Proof

ff - 5 pts (c) No Attempt

! - 15 pts *Incorrect/No Attempt*



3 6 / 15

! - 0 pts *Correct*

⌘ - 15 pts Incorrect

⌘ - 9 pts Implementation

! - 6 pts *Reasoning*

⌘ - 3 pts generate data function

⌘ - 4.5 pts Solving using Cholesky function

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you should give QR code here also.....+3 after confirmation of this





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ff - 7 pts Assumption not justified / Reasons not mentioned / Partially correct Answer

- 6 *Point adjustment*

missing details.....b converse missing





5 0 / 10

☒ - 0 pts Correct Proof (Shows that  $\frac{w}{|w|} \sim \frac{\tilde{w}}{|\tilde{w}|}$ )

! - 10 pts *No Attempt*

☒ - 7 pts Incomplete Proof

☒ - 3 pts Incorrect/Incomplete Proof: Doesn't take into account that the condition number of A is large (as the smallest eigenvalue is much smaller than other eigenvalues).

☒ - 2 pts Details Missing





6 10 / 10

! - 0 pts *Correct Proof (Shows that all eigenvalues are distinct by showing that  $GM(\lambda) = 1$ )*

ff - 10 pts No Attempt

ff - 7 pts Incomplete Proof





7 10 / 10

! - 0 pts *Correct*

ff - 5 pts Incomplete/Incorrect "if" Proof

ff - 5 pts Incomplete/Incorrect "only if" Proof





8 0 / 10

€ - 0 pts Correct

! - 10 pts *Incorrect*

€ - 5 pts original solution and answer analysis not given

€ - 5 pts random noise not added for modification

€ - 8 pts Implementation not given but idea is correct

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for efforts



