Tutorial Quiz 2018

MATH1014 - Mathematics and Applications 2

Tutorial Quiz 7
Calculus and Linear Algebra

Reading time: 1 minute
Writing time: 8 minutes

Student Name: _____
University ID: _____

Question and Answer Book

Structure of Book

Number of questions	Number of questions to be answered	Number of marks
2	2	10

- Students are NOT permitted any calculators or notes during the quiz.
- Students are NOT permitted to colaborate in any form during the quiz. Any signs of collaboration or cheating will result in a nullified score and the course convenor will be informed of any academic misconduct.

Materials supplied
- Question and answer booklet of 5 pages.
- Working space is provided throughout the booklet.

Instructions
- Write your **student number** in the space provided above on this page.

- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

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Question 1

For each statement, decide whether it is always true (**T**) or sometimes false (**F**) and write your answer clearly next to the letter before the statement. Throughout this exercise, M is an $n \times n$ matrix with real entires, i.e., $M \in \mathrm{M}_{n \times n}(\mathbb{R})$.

(a) The eigenvalues of M are real.

(b) If M has k distinct eigenvalues, where $k < n$, then M is diagonalisable.

(c) If M is diagonalisable, then M has n distinct eigenvalues.

(d) If M is a symmetric matrix, then M has real eigenvalues.

(e) If M is a symmetric matrix, then the eigenvalues $\lambda_1, ..., \lambda_n$ all lie on the unit circle.

Question 2

For each statement, decide whether it is always true (**T**) or sometimes false (**F**) and write your answer clearly next to the letter before the statement.

(a) If A and B are similar matrices, then A and B have the same eigenvalues.

(b) If two matrices A and B have the same eigenvalues, then the matrices are similar.

(c) The matrices $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ are similar.

(d) If A and B are similar matrices, then $\det(A) = \det(B)$.

(e) If A and B are similar matrices, then the rank of A is equal to the rank of B.

END OF TUTORIAL QUIZ