2010 Matematik 2A hold 4 : Lay5.3TF

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2010 Matematik 2A hold 4, Lay5.3TF
Alex Bondo Andersen, 6/1/10 at 10:02 AM

Question 1: *Score 0/1*

A is diagonalizable, if $A = PDP^{-1}$ for some matrix D and some invertible matrix P.

INCORRECT

Your Answer: True

Correct Answer: False

Comment: False, if D is not assumed to be a diagonal matrix.

Question 2: *Score 0/1*

If $\boldsymbol{R}^n$ has a basis of eigenvectors of A, then A is diagonalizable.

INCORRECT

Your Answer: False

Correct Answer: True

Question 3: *Score 1/1*

A is diagonalizable if and only if A has n eigenvalues, counting multiplicities.

CORRECT

Your Answer: False

Comment: One way is true. If A is diagonalizable, then A has n eigenvalues, counting multiplicities. But the other direction is false, consider for example

$$\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}.$$

The number one is an eigenvalue with multiplicity 2 (as defined in Lay), but the matrix is not diagonalizable.

Question 4: *Score 0/1*

If A is diagonalizable, then A is invertible.

INCORRECT

Your Answer: True

Correct Answer: False

Comment: A diagonalizable matrix may have zero as an eigenvalue, hence is not invertible.

Question 5: *Score 1/1*

A is diagonalizable, if A has n eigenvectors.

CORRECT

Your Answer: False

Comment: False, since the eigenvectors are not assumed linearly independent.

Question 6: *Score 1/1*

If A is diagonalizable, then A has n distinct eigenvalues.

CORRECT

Your Answer: False

Comment: Consider the identity matrix I. It is diagonal, hence certainly diagonalizable. But it has only the eigenvalue 1.

Question 7: *Score 1/1*

If $AP = PD$, with D diagonal, then the nonzero columns of P must be eigenvectors of A.

CORRECT

Your Answer: True

Question 8: *Score 1/1*

If A is invertible, then A is diagonalizable.

CORRECT

Your Answer: False

Comment: Consider

$$\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}.$$

Since it has determinant 1, it is invertible. But it is not diagonalizable.
