

# Unit 13 - Week 11

## Course outline

How does an NPTEL online course work?

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Week 11

Linear Systems in Two Dimensions

Asymptotic Properties of Orbits of Linear Transformation in IR<sup>2</sup>

Hyperbolic Toral Automorphisms

Quiz : Assignment 11

Week 11 Feedback Form

Week 12

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Assignment Solution

## Assignment 11

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-04-15, 23:59 IST.

Pick the correct options from each question. There is no negative marking

1) Which of the following is/are true;

1 point

- A diagonal matrix is always similar to identity matrix
- A diagonal matrix is always similar to any matrix of the same order
- A diagonal matrix is always similar to an infinite number of matrices
- A diagonal matrix is similar to itself only

No, the answer is incorrect. Score: 0

Accepted Answers: A diagonal matrix is always similar to an infinite number of matrices

2) Which of the following matrices is/are similar to the matrix  $\begin{bmatrix} -4 & 6 \\ 1 & -3 \end{bmatrix}$ ;

1 point

- $\begin{bmatrix} -6 & 0 \\ 0 & -1 \end{bmatrix}$
- $\begin{bmatrix} -1 & 0 \\ 0 & -6 \end{bmatrix}$
- $\begin{bmatrix} 0 & -6 \\ -1 & 1 \end{bmatrix}$
- $\begin{bmatrix} 0 & -6 \\ -1 & 0 \end{bmatrix}$

No, the answer is incorrect. Score: 0

Accepted Answers:

$$\begin{bmatrix} -6 & 0 \\ 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 \\ 0 & -6 \end{bmatrix}$$

3) For the matrix  $\begin{bmatrix} \frac{1}{2} & -\frac{1}{8} \\ \frac{13}{2} & -3 \end{bmatrix}$

1 point

- Origin is a sink
- Origin is a saddle
- Origin is a source
- Origin is a degenerate sink

No, the answer is incorrect. Score: 0

Accepted Answers: Origin is a saddle

4) Which of the following is/are true;

1 point

- For a matrix of the form  $\begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix}$ , origin is a saddle if  $0 < \lambda_1 < \lambda_2 < 1$
- For a matrix of the form  $\begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix}$ , origin is a source if  $\lambda_1 > \lambda_2 > 1$
- For a matrix of the form  $\begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix}$ , origin is a degenerate sink if  $|\lambda| > 1$
- For a matrix of the form  $\begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix}$ , origin is a saddle if  $|\lambda| > 1$

No, the answer is incorrect. Score: 0

Accepted Answers:

For a matrix of the form  $\begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix}$ , origin is a source if  $\lambda_1 > \lambda_2 > 1$

5) Consider the dynamical system  $(\mathbb{T}^2, T)$  as  $T(x_1, x_2) = A \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \pmod{1}$ , where  $A = \begin{bmatrix} 7 & 4 \\ -2 & 1 \end{bmatrix}$ ;

1 point

- $(\mathbb{T}^2, T)$  is topologically transitive
- In  $(\mathbb{T}^2, T)$ , there are only finite number of periodic points
- $(\mathbb{T}^2, T)$  is Devaney Chaotic.
- $(\mathbb{T}^2, T)$  is not Devaney Chaotic

No, the answer is incorrect. Score: 0

Accepted Answers:

$(\mathbb{T}^2, T)$  is topologically transitive  
 $(\mathbb{T}^2, T)$  is Devaney Chaotic.

6) Statement : A hyperbolic toral automorphism is a homeomorphism

1 point

- The given statement is true
- The given statement is not true

No, the answer is incorrect. Score: 0

Accepted Answers:

The given statement is true

7) Statement : A hyperbolic toral automorphism is Devaney Chaotic

1 point

- The given statement is true
- The given statement is not true

No, the answer is incorrect. Score: 0

Accepted Answers:

The given statement is true