Week 4 assignment

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

Due on 2019-02-27, 23:59 IST

1) Consider the system

\[ \dot{X}(t) = \begin{pmatrix} -7 & 1 & -6 \\ 10 & -4 & 12 \\ 2 & -1 & 1 \end{pmatrix} X(t). \]

Then

- all the solutions of the system are stable but not asymptotically stable
- all the solutions of the system are asymptotically stable
- all the solutions of the system are unstable
- all the solutions of the system except the zero solution are unstable

No, the answer is incorrect.
Score: 0
Accepted Answers:
all the solutions of the system are asymptotically stable

2) Consider the system

\[ \dot{X}(t) = \begin{pmatrix} 3 & 2 & 4 \\ 0 & 2 & 0 \\ 4 & 2 & 3 \end{pmatrix} X(t). \]

Then

- all the solutions of the system are stable but not asymptotically stable
- all the solutions of the system are asymptotically stable
- all the solutions of the system are unstable
- all the solutions of the system except the zero solution are unstable

No, the answer is incorrect.
Score: 0
Accepted Answers:
all the solutions of the system are unstable

3) Consider the system

\[ \dot{X}(t) = \begin{pmatrix} 0 & 2 & 0 & 0 \\ -2 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & -2 & 0 \end{pmatrix} X(t). \]
all the solutions of the system except the zero solution are stable but not asymptotically stable

No, the answer is incorrect.
Score: 0
Accepted Answers:

No, the answer is incorrect.
Score: 0
Accepted Answers:

4) Consider the system
\[
\dot{X}(t) = \begin{pmatrix} -1 & -1 \\ 2 & -1 \end{pmatrix} X(t) + \begin{pmatrix} 1 \\ 5 \end{pmatrix}
\]
and the corresponding homogeneous system
\[
\dot{X}(t) = \begin{pmatrix} -1 & -1 \\ 2 & -1 \end{pmatrix} X(t).
\]
Then

- all the solutions of the system (1) are unstable
- all the solutions of the system (2) are asymptotically stable but those of (1) are merely stable
- stability of the solutions of the system (1) does not depend on the stability of the solutions of the sys

No, the answer is incorrect.
Score: 0
Accepted Answers:

5) Consider the nonlinear system
\[
\dot{x} = x - x^3 - xy^2
\]
\[
\dot{y} = 2y - y^5 - yz^4
\]
Then which among the following statements is not correct?

- origin is an unstable steady state
- \((-1, 0)\) is an unstable steady state
- \((0, 2)\) is an unstable steady state
- \((1, 0)\) is an unstable steady state

No, the answer is incorrect.
Score: 0
Accepted Answers:

6) Consider the nonlinear system
\[
\dot{x} = x^2 + y^2 - 1
\]
\[
\dot{y} = 2xy
\]
Let the two statements be
\(P\) (1, 0) and \((-1, 0)\) both are stable equilibrium points
\(Q\) (0, 1) and (0, -1) both are unstable equilibrium points.
Then

- both the statements are false
- only \(P\) is false
- only \(Q\) is false
- both the statements are true

No, the answer is incorrect.
Score: 0
Accepted Answers:
7) Consider the nonlinear system
\[ \dot{x} = \tan(x + y) \]
\[ \dot{y} = x + x^3. \]
Then
- all the equilibrium points of the system are unstable
- only \((0, \pi)\) is unstable
- only \((0, \pi)\) is stable
- all the equilibrium points of the system are stable

No, the answer is incorrect.
Score: 0
Accepted Answers:
- all the equilibrium points of the system are unstable

8) Consider the nonlinear system
\[ \dot{x} = x^2 + y^2 - 1 \]
\[ \dot{y} = x^2 - y^2. \]
Then
- all the equilibrium points of the system are stable
- all the equilibrium points of the system are unstable
- all the equilibrium points of the system except one are stable
- all the equilibrium points of the system except one are unstable

No, the answer is incorrect.
Score: 0
Accepted Answers:
- all the equilibrium points of the system except one are unstable

9) Consider two systems
\[ \dot{x} = y + 3x^2 \]
\[ \dot{y} = x - 3y^2 \quad (1) \]
and
\[ \dot{x} = e^{x+y} - 1 \]
\[ \dot{y} = \sin(x + y) \quad (2) \]
Then origin is
- a stable steady state for the systems
- a stable steady state for (1) but unstable for (2)
- an unstable steady state for (1) but stable for (2)
- unstable steady state for both the systems

No, the answer is incorrect.
Score: 0
Accepted Answers:
- unstable steady state for both the systems

10) Consider two systems
\[ \dot{x} = \cos y - \sin z - 1 \]
\[ \dot{y} = x - y - y^2 \quad (1) \]
and
\[ \dot{x} = -x - y - (x^2 + y^2)^{\frac{1}{2}} \]
\[ \dot{y} = x - y + (x^2 + y^2)^{\frac{1}{2}} \quad (2) \]
Then origin is
- only \(P\) is false
No, the answer is incorrect.
Score: 0
Accepted Answers:
a stable steady state for the systems