MECE 548 Homework 1-2-3

Due date: 31-05-2019

Homework 1

Q1)

 A system is given by the state-space representation: $\dot{x}=\left[\begin{matrix}\begin{matrix}0&-2\\2&0\end{matrix}&\begin{matrix}0&0\\0&0\end{matrix}\\\begin{matrix}0&0\\0&0\end{matrix}&\begin{matrix}0&-2\\2&0\end{matrix}\end{matrix}\right]x+\left[\begin{matrix}a\\\begin{matrix}b\\c\\d\end{matrix}\end{matrix}\right]$u

$$y=\left[\begin{matrix}e&f&\begin{matrix}g&h\end{matrix}\end{matrix}\right]x$$

1. Is this system stable in the sense of Lypunov?
2. Is this system asymptotically stable?
3. For what conditions of a,b,c,d the system is BIBS stable?
4. For what conditions of a,b,c,d,e,f,g,h the system is BIBO stable?

Homework 2

Q1)

 A system is given by the state-space representation: $\dot{x}=\left[\begin{matrix}\begin{matrix}0&-2\\2&0\end{matrix}&\begin{matrix}0&0\\1&0\end{matrix}\\\begin{matrix}0&0\\0&0\end{matrix}&\begin{matrix}0&-2\\2&0\end{matrix}\end{matrix}\right]x+\left[\begin{matrix}a\\\begin{matrix}b\\c\\d\end{matrix}\end{matrix}\right]$u

$$y=\left[\begin{matrix}e&f&\begin{matrix}g&h\end{matrix}\end{matrix}\right]x$$

1. Is this system stable in the sense of Lypunov?
2. Is this system asymptotically stable?
3. For what conditions of a,b,c,d the system is BIBS stable?
4. For what conditions of a,b,c,d,e,f,g,h the system is BIBO stable?

Homework 3

Q1)

 A system is given by the state-space representation: $\dot{x}=\left[\begin{matrix}\begin{matrix}0&1\\0&0\end{matrix}&\begin{matrix}0&0\\0&0\end{matrix}\\\begin{matrix}0&0\\0&0\end{matrix}&\begin{matrix}-1&0\\0&-2\end{matrix}\end{matrix}\right]x+\left[\begin{matrix}a\\\begin{matrix}b\\c\\d\end{matrix}\end{matrix}\right]$u

$$y=\left[\begin{matrix}e&f&\begin{matrix}g&h\end{matrix}\end{matrix}\right]x$$

1. Is this system stable in the sense of Lypunov?
2. Is this system asymptotically stable?
3. For what conditions of a,b,c,d the system is BIBS stable?
4. For what conditions of a,b,c,d,e,f,g,h the system is BIBO stable?

Q2)

 A system is given by the state-space representation: $\dot{x}=\left[\begin{matrix}\begin{matrix}0&0\\0&0\end{matrix}&\begin{matrix}0&0\\0&0\end{matrix}\\\begin{matrix}0&0\\0&0\end{matrix}&\begin{matrix}-1&0\\0&-2\end{matrix}\end{matrix}\right]x+\left[\begin{matrix}a\\\begin{matrix}b\\c\\d\end{matrix}\end{matrix}\right]$u

$$y=\left[\begin{matrix}e&f&\begin{matrix}g&h\end{matrix}\end{matrix}\right]x$$

1. Is this system stable in the sense of Lypunov?
2. Is this system asymptotically stable?
3. For what conditions of a,b,c,d the system is BIBS stable?
4. For what conditions of a,b,c,d,e,f,g,h the system is BIBO stable?