04-May-2019

MECE 548 Midterm

Q1) $\dot{x}$=$\left[\begin{matrix}2&0\\t&2\end{matrix}\right]$x. Find the state transition matrix Φ(t,t0)

Q2) The system representations are given

* $\dot{x}$=$\left[\begin{matrix}0&1&0\\0&0&1\\0.25&0.25&-1\end{matrix}\right]$x+$\left[\begin{matrix}0\\0\\1\end{matrix}\right]u$ y=$\left[\begin{matrix}1&1&0\end{matrix}\right]$x
* $\dot{k}$=$\left[\begin{matrix}-2&0&0\\0&-0.5&0\\0&0&0.5\end{matrix}\right]$k+$\left[\begin{matrix}1\\1\\1\end{matrix}\right]u$, y=$\left[\begin{matrix}0&-1&1\end{matrix}\right]$x
1. Are these systems zero-state equivalent. (Are their transfer function equal)
2. Are these systems equivalent. (Is there a transformation such that k=Tx such that T is a non singular matrix)

Q3)$ \dot{x}$=$\left[\begin{matrix}1&0\\0&0\end{matrix}\right]$x+$\left[\begin{matrix}a\\t\end{matrix}\right]u$. Find a values where this system is completely controllable