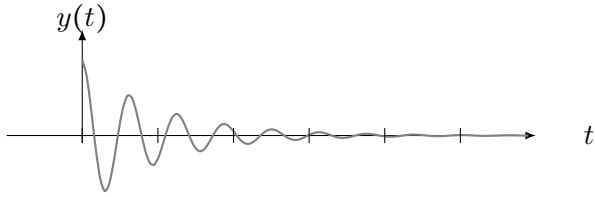
Quizzes of TTK4225 - Systems Theory, Autumn 2020

Damiano Varagnolo

Question 44

May the evolution $y(t)$ given by



correspond to the free evolution of a first order LTI system? And to its forced evolution?

1. yes, yes
2. yes, no
3. no, yes
4. no, no
5. I do not know

Question 45

Transforming the ODE

$$\dddot{y} = 0.3\ddot{y} - 0.1\dot{y} + 1.4y + \dot{u} - 0.1u$$

into a state space system $\dot{\boldsymbol{x}} = A\boldsymbol{x} + B\boldsymbol{u}$, $y = C\boldsymbol{x}$ leads to a matrix A of dimensions

1. 2×2
2. 3×3
3. 4×4
4. 5×5
5. I do not know

Question 46

Transforming the ODE

$$\dddot{y} = 1.4y + \dot{u}$$

into a state space system $\dot{\boldsymbol{x}} = A\boldsymbol{x} + B\boldsymbol{u}$, $y = C\boldsymbol{x}$ leads to a matrix A of dimensions

1. 2×2
2. 3×3
3. 4×4
4. 5×5
5. I do not know

Question 47

Transforming the ODE

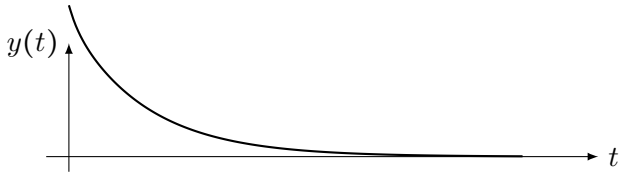
$$\dddot{y} = 1.4y + \dot{u}$$

into a state space system $\dot{\boldsymbol{x}} = A\boldsymbol{x} + B\boldsymbol{u}$, $y = C\boldsymbol{x}$ leads to a matrix B of dimensions

1. 2×2
2. 3×2
3. 3×3
4. 4×3
5. I do not know

Question 48

The following evolution



corresponds to a situation where the system is ...

1. damped
2. underdamped
3. overdamped
4. I do not know

Question 49

The following evolution

corresponds to a situation where the system is ...

1. damped
2. underdamped
3. overdamped
4. I do not know

Open exercise

Transform the ODE

$$\dddot{y} = 0.3\ddot{y} - 0.1\dot{y} + 1.4y + \dot{u} - 0.1u$$

into a state space system $\dot{\boldsymbol{x}} = A\boldsymbol{x} + B\boldsymbol{u}$, $y = C\boldsymbol{x}$.