

## Course „Control Systems 2“

## Exercise Sheet 12

### Task 26:

Consider the LTI SISO system with the state equations

$$\begin{aligned}\dot{\underline{x}} &= \begin{bmatrix} 1.2 & 1.6 \\ 1.6 & -1.2 \end{bmatrix} \underline{x} + \begin{bmatrix} 2 \\ 1 \end{bmatrix} u \\ y &= [1 \quad 0] \underline{x}\end{aligned}$$

- Show that any arbitrary constant output value can be enforced in steady state.
- Determine the parameters  $\underline{m}_x$  and  $m_u$  of a suitable feedforward control unit.
- Draw the block diagram of a state controller consisting of a linear state feedback with vector  $\underline{k}^T$  and the feedforward control calculated in task b).
- Now, assume that the state vector  $\underline{x}$  is estimated using a Luenberger observer and that the estimated state  $\hat{\underline{x}}$  is used to realize the state feedback. Extend the block diagram from task c) accordingly. Is the feedforward control still working for this observer-based implementation? Why (not)?