

## Homework exercise 1: Solution sheet

Please use this sheet to fill in your results and upload it together with the rest of your solution, i.e. your commented written calculations. Note that uploading only these results will not be credited.

a)

Discretized cost functional:

$$J \approx x_N^T Q x_N + \sum_{k=0}^{N-1} x_k^T Q x_k + u_k^T R u_k$$

b) No results have to be filled in.

c)

Discretized differential equation:

$$x_{k+1} = (I + Ah) x_k + hB u_k$$

d)

$$H = \begin{bmatrix} \begin{matrix} Q & 0 \\ \text{---} N \text{ Blocks} & Q \end{matrix} & \begin{matrix} 0 \\ \text{---} N-1 \text{ Blocks} & R \end{matrix} \end{bmatrix} \cdot 2$$

$$f = \begin{bmatrix} 0 \end{bmatrix}, \quad d = 0$$