ELEC-E8116 Model-based control systems /exercises 9

Problem. Consider the system

$$\frac{Y(s)}{U(s)} = \frac{s+0.5}{s^2+2s+4} \quad \text{and the criterion to be minimized } J = \int_0^\infty (3y^2 + 0.5u^2)\,dt.$$

Write a *Matlab m-file* to do the following:

Solve the optimal control law by using the *lqr*-function in Matlab. Calculate the *damping ratio* of the closed loop system. Simulate the system by letting the reference signal be zero (regulator problem) and letting the initial states be non-zero. Then consider the tracking problem. Use a static pre-compensator to set the static gain of the closed-loop system to the value 1. Then simulate the system for a step change in the reference signal.