

ME/ECE859-Spring 2008 Homework 4, Due date: 2/11/08 Monday

1. Exercise 4.17 of the textbook.
2. Exercise 4.23 of the textbook. When  $Q = C^T C$ , the control  $u(t) = -R^{-1} B^T P x(t)$  can be considered as the stationary Linear Quadratic (LQ) optimal state feedback control for the LTI system:

$$\dot{x}(t) = Ax(t) + Bu(t), \quad y(t) = Cx(t).$$

The associated performance cost is

$$J = \frac{1}{2} \int_0^{\infty} x^T(t) Q x(t) + u^T(t) R u(t) dt = \frac{1}{2} \int_0^{\infty} y^T(t) y(t) + u^T(t) R u(t) dt.$$