Optional Homework

$(12/3/13)$

ENG EC/ME/SE 501:

Exercises (Set 8)   (Practice for Hour Quiz)

1. Find the steady-state density for the stochastic differential equation

$$\ddot{x} + \dot{x} + x = \dot{w}$$

where $\dot{w}$ is a unit variance white noise proess. (I.e., w is a unit variance Wiener process.)

2. Consider the linear stochastic system

$$\begin{pmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{pmatrix} = \begin{pmatrix} -1 & 1 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} x_1(t) \\ x_2(t) \end{pmatrix} + \begin{pmatrix} 0 \\ 1 \end{pmatrix} \dot{w}(t)$$

$$y(t) = x_1(t) + \dot{v}(t),$$

where $x_1(0) = x_2(0) = 0$, and w and v are Wiener processes with variances q and 1 respectively. Write down the quations for the Kalman filter for this system.