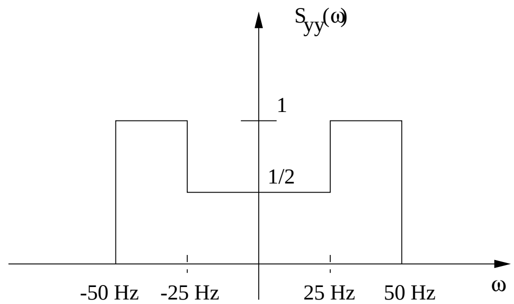
Homework 14

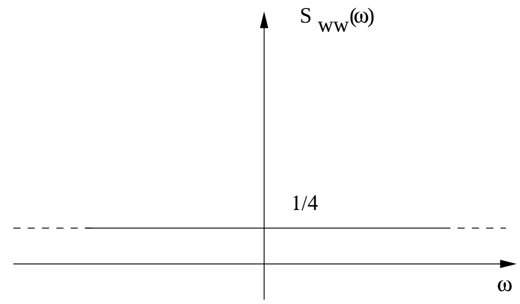
Due Tuesday, November 26, at class

Suppose that we observe a continuous-time random signal $y(t)$ in additive white Gaussian noise $w(t)$:

$$x(t) \;=\; y(t) \;+\; w(t).$$

Furthermore, assume that the power spectra $S_{yy}(\omega)$ and $S_{ww}(\omega)$ are as depicted below.





We wish to estimate the signal $y(t)$. In order to carry this estimation out in a computer, the continuous-time observation process $x(t)$ is sampled at a rate of 200 Hz. Collecting the samples into a signal vector $\mathbf{x}$, specify a DFT-domain Wiener filter for this estimation problem. You may assume that many samples are collected over a long observation period so that truncation effects are minimal.