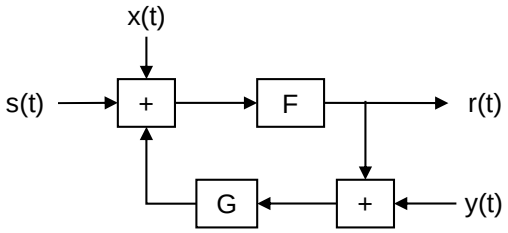
Linear Systems, Black Boxes, and Beyond

Homework #2 (2018-2019), Answers

Q1: Noises and networks

Given the following network, where F and G are linear filters with transfer functions $\tilde{F}(\omega)$ and $\tilde{G}(\omega)$, and $s(t)$, $x(t)$ and $y(t)$ are independent noise inputs with power spectra $P_S(\omega)$, $P_X(\omega)$, and $P_Y(\omega)$, calculate the power spectrum $P_R(\omega)$ of $r(t)$.



Q2: Distinguishing signals

As mentioned in the notes, the power spectrum of a Poisson impulse train is flat (page 24 of LSBB). So is the power spectrum of white noise. If a Poisson impulse train and a white noise signal are filtered by the same linear filter, will the resulting power spectra be the same?