

Problem Set 5
due November 14

1. True, False, or Uncertain and Explain

Assume throughout that x_t is 0 mean, second order stationary, finite variance.

- i. The fundamental moving average coefficients must obey $\sum_{j=0}^{\infty} \alpha_j < \infty$ since the process has finite variance.
- ii. Suppose that x_t is filtered so that the spectral density is unchanged except at frequencies $\bar{\omega}$ and $-\bar{\omega}$. The original and filtered series must have the same variance.
- iii. The spectral density of the sum of two time series equals the sum of the spectral densities.

uncertain
all you need to check if autocovar func of X+Y equals sum of autocovar funcs
it's not -- look at the summation
 $\text{Cov}[X1 + Y1, X2 + Y2] \neq \text{Cov}[X1, X2] + \text{Cov}[Y1, Y2]$
unless $\text{Cov}[X1, Y2] = \text{Cov}[X2, Y1] = 0$

2. Measurement error and spectral densities

Suppose x_t is an AR(1) process. Suppose that we only have data on $x_t^* = x_t + \eta_t$ where η_t is white noise such that $\text{cov}(x_t, \eta_{t-k}) = 0 \forall k$. Is x_t^* also an AR(1) process? Interpret your answer.