Homework 5.

1. (A variant of problem 4.5 in the text). If \( \{X_t\} \) and \( \{Y_t\} \) are uncorrelated stationary sequences, i.e. if \( X_r \) and \( Y_s \) are uncorrelated for every \( r \) and \( s \), show that \( \{X_t + Y_t\} \) is stationary with spectral density function equal to the sum of the spectral density functions of \( \{X_t\} \) and \( \{Y_t\} \).

2. (Problem 4.6 in the text.) Let \( \{X_t\} \) be the process defined by

\[
X_t = A \cos(\pi t/3) + B \sin(\pi t/3) + Y_t
\]

where \( Y_t = Z_t + 2.5Z_{t-1}, \) \( \{Z_t\} \sim WN(0, \sigma^2) \), \( A \) and \( B \) are uncorrelated with mean 0 and variance \( \nu^2 \), and \( Z_t \) is uncorrelated with \( A \) and \( B \) for each \( t \). Find the autocovariance function and spectral distribution function of \( \{X_t\} \).