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271A - Homework 6

Problem 1. Consider the discrete time process $X_n = a + bt + \zeta_n$ with ζ_n, $n = 0, \pm 1, \pm 2, \dots$ being iid centered with variance σ^2 and a, b constants. Define

$$W_n = (2q+1)^{-1} \sum_{j=-q}^{q} X_{n+j}.$$

Compute the autocovariance function of $W_n : \gamma(n,m) = \mathrm{Cov}(W_n, W_m)$ and the autocorrelation function $\rho(n,m) = \mathrm{Corr}(W_n, W_m)$. Consider $Y_n = W_n - W_{n-1}$ and compute the autocovariance and autocorrelation functions for this process. Are either of these processes stationary?

Solution. □