

Exercises 13

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The below are in-class exercises designed to help solidify your understanding of the material covered in the notes. They will also aid you in completing some homework problems. Please work together with your group to complete as many of these problems as you can.

PN refers to the online textbook by Pishro-Nik available here. Please do not look at the solutions until after you have completed the problem or received hints from me.

Exercise 1

PN 10.1.5, problem 1

Exercise 2

PN 10.2.5, problem 1

Exercise 3

PN 10.2.5, problem 5

Exercise 4

Let X_t be a WSS RP with correlation function

$$R_X(\tau) = Ae^{\alpha|\tau|}.$$

Find the second moment of the RV

$$Y = X_5 - X_2.$$

Exercise 5

Let $X_t = A \cos(\omega t + \theta)$ where ω and θ are constants and A is a RV. Is X_t WSS?

Exercise 6

Let X_t be WSS with $R_X(\tau) = e^{-\tau^2/2}$, and let h have transfer function $H(f) = j2\pi f$. Find $R_{XY}(\tau)$ and $R_Y(\tau)$, where Y_t is the output of the system.