Student Name:

Homework # 8

Instructions: Prepare your deliverables in clean letter size printer-quality papers with a high-contrast pencil (engineering pads are also accepted). Attach this assignment sheet as cover page, show all your work, and box all your solutions. All Matlab code needs to be published, and all figures needs to have proper axis labeling and legends. Homework assignments will be collected during class time on the due date. *No late homework or submission that do not strictly follow the provided instructions will not be accepted.*

- **Homework problems not to be graded**
  - From textbook:
    - Ch 5: 7.3, 8.2, 8.3, 9.2

- **Homework problems to be graded**

  A telemetry voltage, V, transmitted from a position sensor on a ship's rudder, is a random variable with PDF

$$f_V(v) = \begin{cases} \frac{1}{12}, & -6 \le v \le 6 \\ 0, & \text{otherwise} \end{cases}$$

  A receiver in the ship's control room receives $R = V + X$, where X is a Gaussian $(\mu_X = 0, \sigma_X^2 = 3)$ random variable independent of V and represents noise voltage in the received signal. The receiver uses the noisy signal R to calculate a linear estimate of the telemetry voltage $\hat{V} = aR + b$.

  Find the following:

  a) The expected value of R
  b) The variance of R
  c) The covariance $\mathrm{Cov}[V, R]$
  d) The optimum coefficients (a, b) for the linear estimate $\hat{V}$