

# EE 503

## Homework 5

Due Wednesday October 2, 2019 at 6 p.m.

**Work all 6 problems.**

**Problem 1.** Suppose  $X \sim N(0, 1)$ . Let  $Y = X^2$ . Find the pdf of  $Y$ .

**Problem 2.** Suppose  $X$  is uniform over the interval  $(-1, 1)$ . Let  $W = |X|$ . Find the pdf of  $W$ .

**Problem 3.** Suppose  $P(X = k) = \beta(1 - \beta)^{k-1}$ ,  $0 < \beta < 1$ ,  $k = 1, 2, 3, \dots$ . Find  $E(X)$ .

**Problem 4.** The continuous random variable  $X$  has pdf

$$f(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0, & \text{elsewhere.} \end{cases}$$

Find  $E(X)$ .

**Problem 5.** The continuous random variable  $X$  has pdf

$$f(x) = \begin{cases} 3x^2, & 0 \leq x \leq 1 \\ 0, & \text{elsewhere.} \end{cases}$$

Let  $Y = X^4$ . Find  $E(Y)$ .

*Remark:* You do not need to find the pdf of  $Y$  to work this problem.

**Problem 6.** Text 4.34. The Pareto random variable  $X$  has cdf

$$F_X(x) = \begin{cases} 0, & x < x_m \\ 1 - \frac{x_m^\alpha}{x^\alpha}, & x \geq x_m, \quad x_m > 0, \quad \alpha > 0. \end{cases}$$

- Find and plot the pdf of  $X$ .
- Find and plot  $F_X(x|X > t)$ .
- Find and plot  $f_X(x|X > t)$ .