

Hw 5

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3.1.1 The cumulative distribution function of random variable X is

$$F_X(x) = \begin{cases} 0 & x < -1, \\ (x + 1)/2 & -1 \leq x < 1, \\ 1 & x \geq 1. \end{cases}$$

- (a) What is $P[X > 1/2]$?
- (b) What is $P[-1/2 < X \leq 3/4]$?
- (c) What is $P[|X| \leq 1/2]$?
- (d) What is the value of a such that $P[X \leq a] = 0.8$?

3.2.1 The random variable X has probability density function

$$f_X(x) = \begin{cases} cx & 0 \leq x \leq 2, \\ 0 & \text{otherwise.} \end{cases}$$

Use the PDF to find

- (a) the constant c ,
- (b) $P[0 \leq X \leq 1]$,
- (c) $P[-1/2 \leq X \leq 1/2]$,
- (d) the CDF $F_X(x)$.

3.3.4 The probability density function of random variable Y is

$$f_Y(y) = \begin{cases} y/2 & 0 \leq y < 2, \\ 0 & \text{otherwise.} \end{cases}$$

What are $E[Y]$ and $\text{Var}[Y]$?

3.4.2 Y is an exponential random variable with variance $\text{Var}[Y] = 25$.

- (a) What is the PDF of Y ?
- (b) What is $E[Y^2]$?
- (c) What is $P[Y > 5]$?

3.5.1 The peak temperature T , as measured in degrees Fahrenheit, on a July day in New Jersey is the Gaussian $(85, 10)$ random variable. What is $P[T > 100]$, $P[T < 60]$, and $P[70 \leq T \leq 100]$?

3.5.2 What is the probability that the peak temperature on a July day in New Jersey is between 70 and 100 degrees Fahrenheit?