

HW8: Questions from [Yates & Goodman, 2005]

3.1.3 The CDF of random variable W is

$$F_W(w) = \begin{cases} 0 & w < -5, \\ (w + 5)/8 & -5 \leq w < -3, \\ 1/4 & -3 \leq w < 3, \\ 1/4 + 3(w - 3)/8 & 3 \leq w < 5, \\ 1 & w \geq 5. \end{cases}$$

- (a) What is $P[W \leq 4]$?
- (b) What is $P[-2 < W \leq 2]$?
- (c) What is $P[W > 0]$?
- (d) What is the value of a such that $P[W \leq a] = 1/2$?

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 $F_X(x)$.

3.2.3 Find the PDF $f_U(u)$ of the random variable U in Problem 3.1.3.

Remark: In Q3.1.3, the random variable is W (not U). So, replace the U and u in this question with W and w , respectively.

Q3.3.4

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 $\text{Var}[Y]$?

Q3.3.6

The cumulative distribution function of random variable V is

$$F_V(v) = \begin{cases} 0 & v < -5, \\ (v+5)^2/144 & -5 \leq v < 7, \\ 1 & v \geq 7. \end{cases}$$

- (a) What is $E[V]$?
- (b) What is $\text{Var}[V]$?
- (c) What is $E[V^3]$?

Q3.4.5

X is a continuous uniform $(-5, 5)$ random variable.

- (a) What is the PDF $f_X(x)$?
- (b) What is the CDF $F_X(x)$?
- (c) What is $E[X]$?
- (d) What is $E[X^5]$?
- (e) What is $E[e^X]$?