

EECS 861
Homework 3

1. X is a discrete random variable with
 $P(X=-2) = a$, $P(X=-1) = 0.3$, $P(X=2) = 0.35$, $P(X=1) = 0.05$
 - a. Find “a”
 Given “a” find:
 - b. Find $P(X < 0)$
 - c. Find $E[X]$
 - d. Find $E[X^2]$
 - e. Find $\text{Var}[X]$

2. X is a random variable with $f_X(x) = 0.2\delta(x) + 0.8u(x)e^{-x}$ where $u(x)$ = unit step function
 - a. Sketch $f_X(x)$.
 - b. Verify that the total probability is 1, i.e., $\int_{-\infty}^{\infty} f_X(x) dx = 1$
 - c. What is $P(X=0)$?
 - d. What is $P(X=2)$?
 - e. What is $P(-1 < X < 1)$?
 - f. Find $E[X]$

3. X is a Gaussian random variable with $\mu_X = 20$ and $\sigma_X = 4$,
 - a. Find $P(X > 15)$
 - b. Find $P(X < 25)$
 - c. Find $P(15 < X < 25)$

4. X is a Gaussian random variable with $\mu_X = 0$ and σ_X . Plot $P(X > 1)$ as a function of σ_X .

5. X is random variable with a uniform distribution [100, 200]
 - a. Find $P(X > 190)$
 - b. Find $P(X < 50)$
 - c. Find μ_X and σ_X

6. X and Y have the following joint distribution function

	X=-1	X=0	X=1
Y=-1	1/8	0	1/8
Y=0	0	1/8	0
Y=1	1/4	1/4	1/8

- a. Is this a valid joint distribution function? YES or NO
 - b. Find $P(X=0)$.
 - c. Find $P(Y=-1)$.
 - d. Find $P(X=0|Y=-1)$.
 - e. Find ρ_{XY} .
7. Chapter 2: Problem 2.18