

Student Name _____ Student ID _____

EE 325 | Section 01 | Homework Assignment 1

Due date: Tuesday 4th February 2020 before the lecture begins!

1. Find the answers for the following questions

a. $\sum_{i=1}^5 (a + bx_i)$

b. $\sum_{y=0}^5 f(x+y)$

c. $\sum_{i=1}^{10} i^2$

d. $\sum_{x=1}^2 \sum_{y=2}^3 (2x+y)$

2. Given X is discrete random variable. The probability distribution function (PDF) of this variable is shown in the table

X	-2	-1	0	1	2	3	4
$f(x)$	$0.5b$	b	$2.25b$	$2b$	$1.5b$	$0.5b$	$0.25b$

when b is constant number

- a. Find the value of b

- b. Find the answer for $P(X \leq 2)$

- c. Find the answer for $P(-2 \leq X \leq 3)$

- d. Find the answer for $P(X \geq 1)$

3. Given X is continuous random variable. The probability distribution function (PDF) of this variable is

$$f(x) = -\frac{1}{9}x + \frac{6}{9}, 0 \leq x \leq 3$$

- a. Plot graph for $f(x)$

- b. Find the answer for $P(1 \leq X \leq 3)$

- c. Find the answer for $P(X \geq 2)$

- d. Find the expected value of X

4. Let random variable X be the outcome of throwing one dice and random variable Y be the outcome of tossing one coin. Coin has two sided that has valued 1 and 0.
- Construct the joint probability distribution function (PDF) table of X and Y
 - Find the marginal probability distribution function (PDF) of X
 - Find the marginal probability distribution function (PDF) of Y

d. Find the conditional probability distribution function (PDF) of X given Y is equal to 1

e. Find the expected value of X given Y is equal to 1

f. Find the variance of X given Y is equal to 1

5. If X_1, X_2, X_3 is a random sample from a population with mean μ and variance σ^2 . X_1, X_2, X_3 are not independent $Cov(X_1, X_2) = Cov(X_1, X_3) = Cov(X_2, X_3) = \frac{1}{4}\sigma^2$

$\bar{X}$ is estimator used to estimate mean value. $\bar{X} = \frac{1}{3}(X_1 + X_2 + X_3)$

Find $E(\bar{X})$ and $var(\bar{X})$

6. Given X_1, X_2, X_3, X_4 are independent identically distributed random variables from population with mean μ and variance σ^2 . $\bar{X}$ is estimator used to estimate mean value. $\bar{X} = \frac{1}{4}(X_1 + X_2 + X_3 + X_4)$

a. Find $E(\bar{X})$ and $\text{var}(\bar{X})$ in term of μ and σ

- b. Given $\tilde{X} = \frac{1}{8}X_1 + \frac{1}{4}X_2 + \frac{1}{8}X_3 + \frac{1}{2}X_4$ is another estimator of μ . Show that $\tilde{X}$ is an unbiased estimator of μ

c. Between $\bar{X}$ and $\tilde{X}$, which one is the better estimator for μ ? Why?