

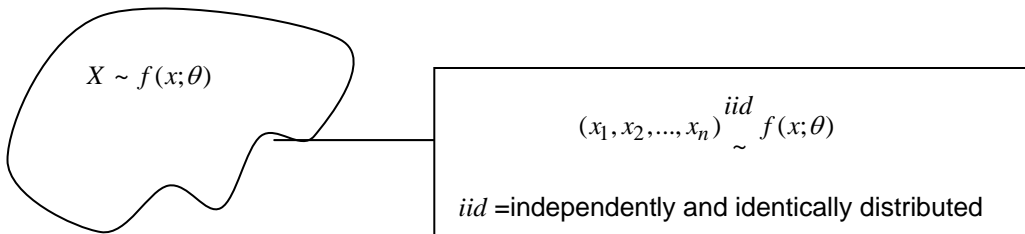
Chapter 3.

3.1 (Definition)

X 가 가 () (finite) (countable)
 (discrete) . (continuous)

, (parameter)

(histogram), Polygon



(population) (people, organization, animals, plants or things)

(sample)

(parameter) , θ (μ),

(σ^2)

(statistic) , (\bar{x}), (s^2)

(estimate) (point) (interval)

$\hat{\theta}, (\hat{\theta}_L, \hat{\theta}_U)$. For example, $\hat{\theta} = \bar{x}$, $(\bar{x} - t(n-1; 1-\alpha/2) * s / \sqrt{n}, \bar{x} + t(n-1; 1-\alpha/2) * s / \sqrt{n})$

가 (Hypothesis testing) 가 (가 , 가)

3.2 (Probability Distribution)

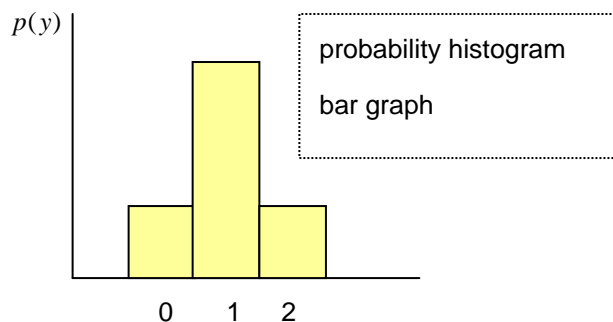
$(X = x)$, S () x .
 □ X 가 x 가 $P(X = x)$ $p(x)$
 x .
 □ X (probability density function, pdf) X 가 가
 x $p(x)$, , x .
 가 (domain, X -), $p(x)$ 가 (range, Y -)
 (probability mass function) .



EXAMPLE 3-1

3 , 3 . 2
 X . X .

y	$p(y)$
0	1/5
1	3/5
2	1/5



$$p(x) = \frac{\binom{3}{x} \binom{3}{2-x}}{\binom{6}{2}}, x = 0, 1, 2$$



EXAMPLE 3-2

(2)

5 ($1 - 5$ 가) . 2
 (1) X .
 (2) X .

(Theorem)

$$0 \leq p(x) \leq 1, \text{ for all } x$$

$$\sum_x p(x) = 1$$



EXAMPLE 3-3

가 가 c .

$$p(x) = cx, x = 1, 2, \dots, 10$$

$$p(x) = c(1/4)^x, x = 1, 2, 3, \dots$$

$$p(x) = x/c, x = 1, 2, 3, \dots, n$$



EXAMPLE 3-4

(2)

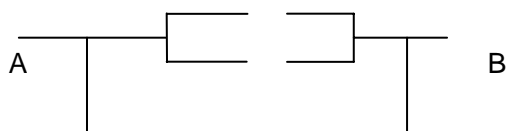
3 3 O+, 15 1 O- .
 X O+ 가 , Y O- 가
 X, Y . (joint) ,



HOMEWORK #5-1

DUE 3 24 ()

가 0.9 . X





HOMEWORK #5-2

DUE 3 24 ()

X	0, 0, 0, 2, 2, 2,	Y	0, 1, 4, 5, 8, 9	가	.
W	$(X+Y)$	W		.	.

3.3 (The expected value)

(,) ()
 (descriptive values) (mean), (median), (variance), (range)

X 가 $p(x)$ 가 X

$$E(X) = \sum_x xp(x)$$

$(X - E(X))^2$ $V(X)$ X (variance) $V(X) = E[(X - E(X))^2]$
 X (standard deviation)

$$\mu = E(X) \quad \sigma^2 = E(X - \mu)^2$$

$$\bar{X} = \sum x_i / n, \quad s^2 = \sum (X - \bar{x})^2 / n$$

$$X \quad g(x) \quad E(g(X)) = \sum_x g(x)p(x)$$

(THEOREM)

$$E(c) = c$$

$$E[cg(X)] = cE[g(X)], E[cX] = cE[X]$$

$$E[\sum_i^n a_i X_i] = \sum_i^n a_i E[X_i], E[\sum_i^n a_i g(X_i)] = \sum_i^n a_i E[g(X_i)], \quad a_i \text{ for } i = 1, 2, \dots, n$$

$$V(X) = E[(X - \mu)^2] = E(X^2) - \mu^2$$



EXAMPLE 3-4

EXAMPLE 3-1 $E(X), E(1/X), E(X^2 - 1), V(X)$.



EXAMPLE 3-5

	A	B	. t		A
	X_1	,	$0.1t$	B	X_2
$0.12t$.	A		$C_A = 10t + 30X_1^2$,	B
$C_B = 8t + 30X_2^2$.	10		, 20	
?					



HOMEWORK #5-3

DUE 3 24 ()

a, b , X $E(aX + b) = aE(X) + b$ $V(aX + b) = a^2V(X)$

X 가 μ , σ^2 가 $Z = \frac{X - \mu}{\sigma}$ (. Standardized)



HOMEWORK #5-4

DUE 3 24 ()

X 0.1, 1/3, 2/3 .

0.9 . 500,000 .

$p(x), E(X)$ and $V(X)$.