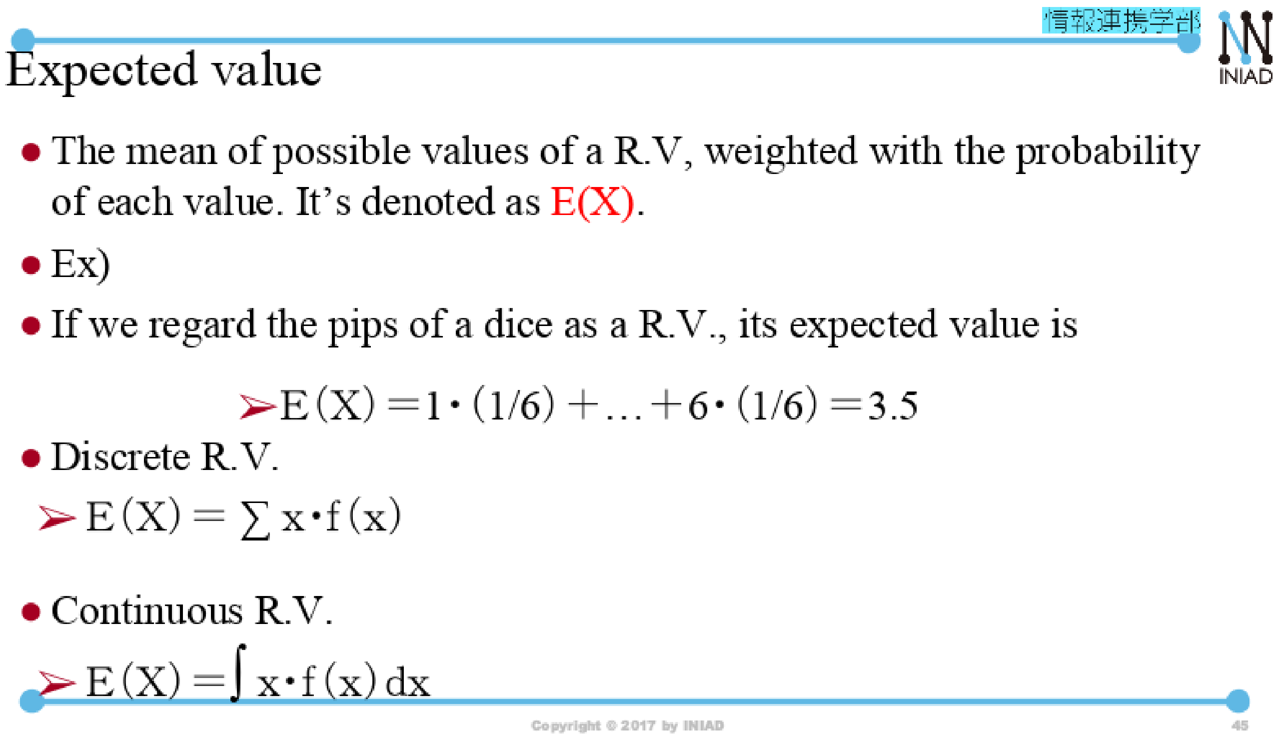
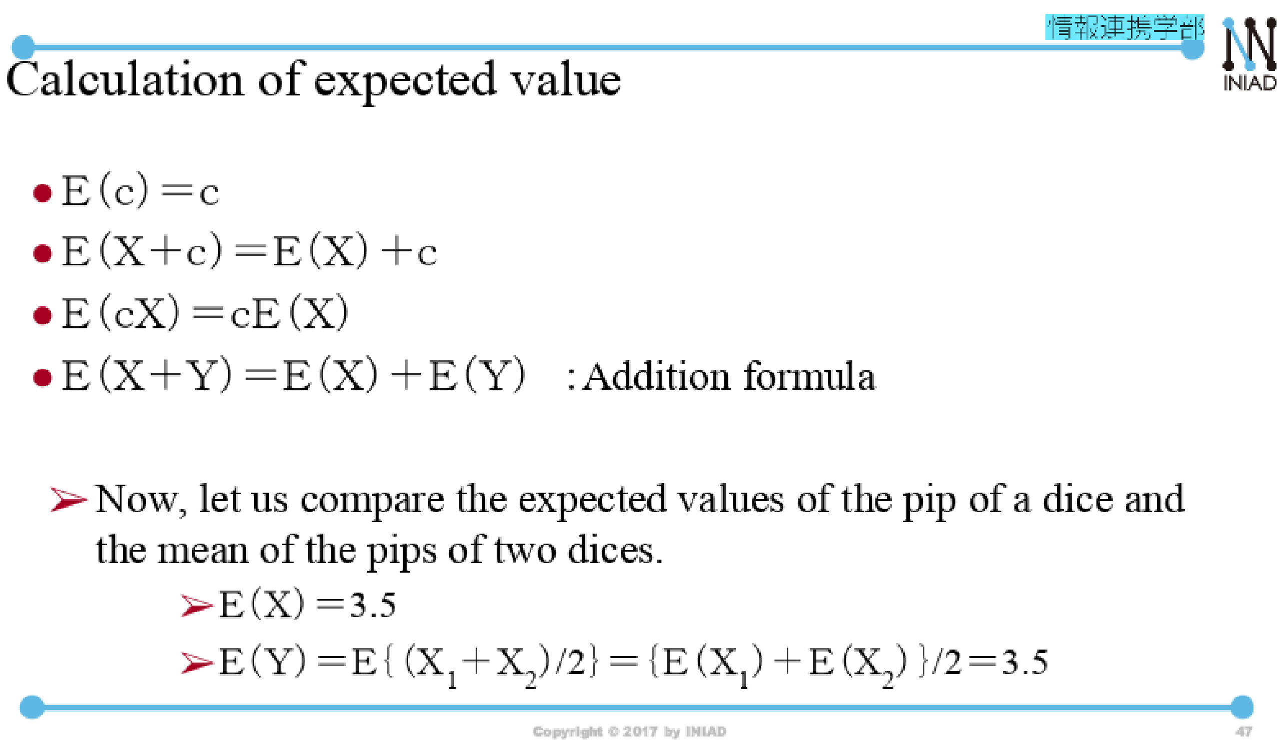
Probability

Notebook:	INIAD Statistics		
Created:	10/18/2018 9:42 PM	**Updated:**	10/19/2018 11:45 AM
Author:	danganhvu1998		

- **P (A): Probability that event A happen**
  - $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- **Expected Value**
  - 

  - 

- **Variance**
  - Variance：the scale of variation of a R.V. around its expected value.

情報連携学部 INIAD

Variance

- Let us denote the expected value and variance as $\mu = E(X)$ and $V(X)$, respectively.
  - $V(X) = E\{(X-\mu)^2\}$
- For discrete R.V.s,
  - $V(X) = \sum (x-\mu)^2 f(x)$
- For continuous R.V.s,
  - $V(X) = \int (x-\mu)^2 f(x)\,dx$

The following formula is frequently used.

- $V(X) = E(X^2) - \{E(X)\}^2$

(Expected value of X^2)
-(squared expected value)

Copyright © 2017 by INIAD

- $V(c) = 0$
- $V(X + c) = V(X)$
- $V(cX) = c^2 V(X)$

- **Standard deviation and z-variable**

Standard deviation and z-variable

- Standard deviation is the square root of variance.
- It is denoted as D[X].

$$D[X] = \sqrt{V[X]}$$

- Normalization of R.V.

$$Z = \frac{(X - E[X])}{D[X]}$$

  - Every R.V. can be transformed to another R.V. Z that satisfies
  - $E[Z]=0, \ V[Z]=1$
  - This Z is called as the normalized R.V.

- **Calculate Variance (And Stardark Deviation)**

$$S^2 = \frac{n_A\{S_A^2 + (\bar{x} - \bar{x}_A)^2\} + n_B\{S_B^2 + (\bar{x} - \bar{x}_B)^2\}}{n}.$$

And

$$V[X] = E[X^2] - \bar{x}^2 = \frac{n_A\left(S_A^2 + \bar{x}_A^2\right) + n_B\left(S_B^2 + \bar{x}_B^2\right)}{n} - \bar{x}^2$$

。