

Multiple Random Variables

Young W Lim

April 21, 2018

Copyright (c) 2018 Young W. Lim. Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

This work is licensed under a Creative Commons "Attribution-NonCommercial-ShareAlike 3.0 Unported" license.



Based on
Probability, Random Variables and Random Signal Principles,
P.Z. Peebles,Jr. and B. Shi

Outline

- 1 A vector random variable (a random vector)

A Vector Random Variable

a random vector

Definition

two random variables X and Y

x and y : specific values of X and Y

the ordered pair pair of numbers

(x,y) : a random point in the xy plane

Range Sample Space

two dimensional product space, a joint sample space S_J

Definition

an event $A = \{X \leq x\}$

refers to the sample space $S : \{X(s) \leq x\}$

an event $B = \{Y \leq y\}$

refers to the sample space $S : \{Y(s) \leq y\}$

a joint event $A \cap B = \{X \leq x, Y \leq y\}$

refers to the sample space $S_J : \{X(s) \leq x, Y(s) \leq y\}$

General Range Sample Space

multi-dimensional product space, a joint sample space S_J

N random variables : X_1, X_2, \dots, X_N

defined on a sample space S

an N -dimensional random vector

(N -dimensional random variable)

N -dimensional joint sample space