

Assignment 12

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June 1, 2022

Outline

- 1 Question
- 2 Given and known equations
- 3 Solution

Question

Probability, Random Variables and Stochastic Processes Chapter 6,
Problem 6-72

Show that if random variables x and y are independent and $z = x + y$,
then $f_z(z|x) = f_y(z - x)$

Solution

Given,
 x and y are independent,

$$z = x + y \quad (1)$$

$$\implies f_{xz}(x, z) = f_{xy}(x, z - x) \quad (2)$$

$$\text{Also, } f_{xy}(x, y) = f_x(x) f_y(y) \quad (3)$$

Solution

$$\text{We know that, } f_z(z|x) = \frac{f_{xz}(x, z)}{f_x(x)} \quad (4)$$

$$\text{From equation (2), } f_z(z|x) = \frac{f_{xy}(x, z-x)}{f_x(x)} \quad (5)$$

$$\text{From equation (3), } f_z(z|x) = \frac{f_x(x) f_y(z-x)}{f_x(x)} \quad (6)$$

$$\implies f_z(z|x) = f_y(z-x) \quad (7)$$