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Unit overview

Lec. 11: Derived  
distributionsExercises 11 due Mar  
30, 2016 at 23:59 UTCUnit 6: Further topics on random variables > Problem Set 6 > Problem 4 Vertical:  
Convolution calculations

Bookmark

## Problem 4: Convolution calculations

(6/6 points)

1. Let the discrete random variable  $X$  be uniform on  $\{0, 1, 2\}$  and let the discrete random variable  $Y$  be uniform on  $\{3, 4\}$ . Assume that  $X$  and  $Y$  are independent. Find the PMF of  $X + Y$  using convolution. Determine the values of the constants  $a$ ,  $b$ ,  $c$ , and  $d$  that appear in the following specification of the PMF.

$$p_{X+Y}(z) = \begin{cases} a, & z = 3, \\ b, & z = 4, \\ c, & z = 5, \\ d, & z = 6, \\ 0, & \text{otherwise.} \end{cases}$$

 $a =$  $b =$  $c =$  $d =$ 

2. Let the random variable  $X$  be uniform on  $[0, 2]$  and the random variable  $Y$  be uniform on  $[3, 4]$ . (Note that in this case,  $X$  and  $Y$  are continuous random variables.) Assume that  $X$  and  $Y$  are independent. Let  $Z = X + Y$ . Find the PDF of  $Z$  using convolution. The following figure shows a plot of this PDF. Determine the values of  $a$ ,  $b$ ,  $c$ ,  $d$ , and  $e$ .

**Lec. 12: Sums of independent r.v.'s; Covariance and correlation**

Exercises 12 due Mar 30, 2016 at 23:59 UTC

**Lec. 13: Conditional expectation and variance revisited; Sum of a random number of independent r.v.'s**

Exercises 13 due Mar 30, 2016 at 23:59 UTC

**Solved problems**

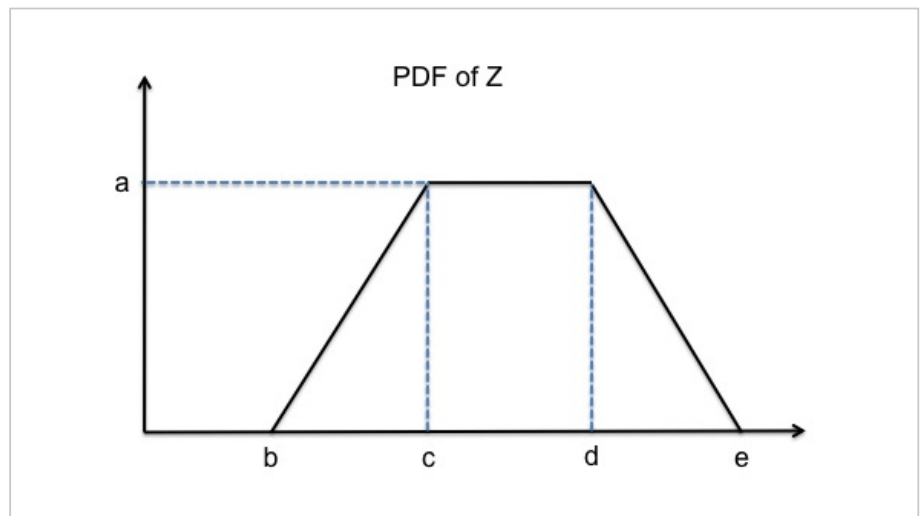
**Additional theoretical material**

**Problem Set 6**

Problem Set 6 due Mar 30, 2016 at 23:59 UTC

**Unit summary**

► **Unit 7: Bayesian inference**



$$a = \boxed{1/2} \quad \checkmark$$

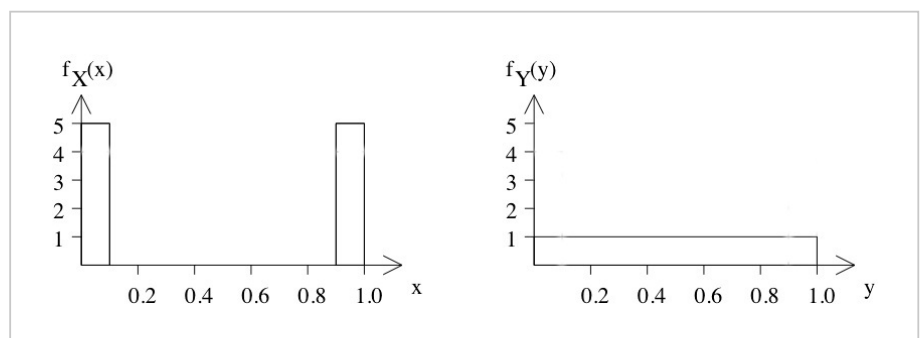
$$b = \boxed{3} \quad \checkmark$$

$$c = \boxed{4} \quad \checkmark$$

$$d = \boxed{5} \quad \checkmark$$

$$e = \boxed{6} \quad \checkmark$$

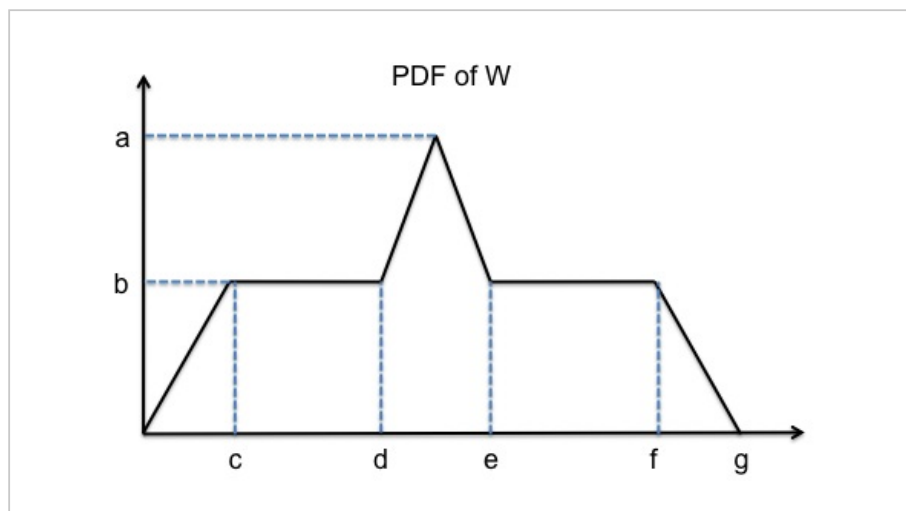
3. Let  $\mathbf{X}$  and  $\mathbf{Y}$  be two independent random variables with the PDFs shown below.



$$f_X(x) = \begin{cases} 5, & \text{if } 0 \leq x \leq 0.1 \text{ or } 0.9 \leq x \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

$$f_Y(y) = \begin{cases} 1, & \text{if } 0 \leq y \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

Let  $W = X + Y$ . The following figure shows a plot of the PDF of  $W$ . Determine the values of  $a$ ,  $b$ ,  $c$ ,  $d$ ,  $e$ ,  $f$ , and  $g$ .



- $a =$   ✓
- $b =$   ✓
- $c =$   ✓
- $d =$   ✓
- $e =$   ✓
- $f =$   ✓
- $g =$   ✓

*You have used 1 of 2 submissions*

## DISCUSSION

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