



## MITx: 6.041x Introduction to Probability - The Science of Uncertainty



Bookmarks

- ▶ Unit 0: Overview
- ▶ Entrance Survey
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Unit overview

Lec. 5: Probability mass functions and expectations

Exercises 5 due Mar 02, 2016 at 23:59 UTC

**Lec. 6: Variance; Conditioning on an event; Multiple r.v.'s**

Exercises 6 due Mar 02, 2016 at 23:59 UTC

Lec. 7: Conditioning on a random variable; Independence of r.v.'s

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Bookmark

## Exercise: Expected value rule

(5/6 points)

Let  $\mathbf{X}$  and  $\mathbf{Y}$  be discrete random variables. For each one of the formulas below, state whether it is true or false.

a)  $\mathbf{E}[X^2] = \sum_x x p_X(x^2)$

False ▾



Answer: False

b)  $\mathbf{E}[X^2] = \sum_x x^2 p_X(x)$

True ▾



Answer: True

c)  $\mathbf{E}[X^2] = \sum_x x^2 p_{X,Y}(x)$

True ▾



Answer: False

d)  $\mathbf{E}[X^2] = \sum_x x^2 p_{X,Y}(x, y)$

False ▾



Answer: False

e)  $\mathbf{E}[X^2] = \sum_x \sum_y x^2 p_{X,Y}(x, y)$

True ▾



Answer: True

f)  $\mathbf{E}[X^2] = \sum_z z p_{X^2}(z)$

True ▾



Answer: True

Answer:

a) False. This does not follow from any of our formulas.

b) True. This is the expected value rule for a function of a single random variable.

Exercises 7 due Mar  
02, 2016 at 23:59 UTC

### Solved problems

### Additional theoretical material

### Problem Set 4

Problem Set 4 due Mar  
02, 2016 at 23:59 UTC

### Unit summary

- ▶ Unit 5:  
Continuous  
random  
variables

c) False. This is syntactically wrong since the function  $p_{X,Y}$  needs two arguments.

d) False. The left-hand side is a number whereas the right-hand side is actually a function of  $y$ .

e) True. This is the expected value rule

$$\mathbf{E}[g(X, Y)] = \sum_x \sum_y g(x, y) p_{X,Y}(x, y),$$

for the function  $g(x, y) = x^2$ .

f) True. This is just the definition of the expectation  $\mathbf{E}[Z] = \sum_z p_Z(z)$ , where  $Z$  is the random variable  $X^2$ .

*You have used 1 of 1 submissions*

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