



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



Bookmarks

- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▶ Unit 1: Probability models and axioms
- ▶ Unit 2: Conditioning and independence
- ▶ Unit 3: Counting
- ▶ Unit 4: Discrete random variables
- ▶ Exam 1
- ▶ Unit 5: Continuous random variables

Unit 9: Bernoulli and Poisson processes &gt; Lec. 21: The Bernoulli process &gt; Lec 21 The Bernoulli process vertical

Bookmark

## Exercise: The Bernoulli process

(3/4 points)

Let  $X_1, X_2, \dots$  be a Bernoulli process. We will define some new sequences of random variables and inquire whether they form a Bernoulli process.

1. Let  $Y_n = X_{2n}$ . Is the sequence  $Y_n$  a Bernoulli process?

Yes ▾



Answer: Yes

2. Let  $U_n = X_{n+1}$ . Is the sequence  $U_n$  a Bernoulli process?

Yes ▾



Answer: Yes

3. Let  $V_n = X_n + X_{n+1}$ . Is the sequence  $V_n$  a Bernoulli process?

No ▾




Answer: No


- ▶ Unit 6: Further topics on random variables
- ▶ Unit 7: Bayesian inference
- ▶ Exam 2
- ▶ Unit 8: Limit theorems and classical statistics
- ▼ **Unit 9: Bernoulli and Poisson processes**

#### Unit overview

#### **Lec. 21: The Bernoulli process**

Exercises 21 due May 11, 2016 at 23:59 UTC 

#### **Lec. 22: The Poisson process**

Exercises 22 due May 11, 2016 at 23:59 UTC 

#### **Lec. 23: More on the Poisson process**

4. Let  $W_n = (-1)^n X_n$ . Is the sequence  $W_n$  a Bernoulli process?


Yes ▼

✗ Answer: No

Answer:

1. Yes, because the random variables  $X_{2n}$  are independent Bernoulli random variables with the same parameter.
2. Yes, for the same reason.
3. No, because, for example  $V_1 = X_1 + X_2$  and  $V_2 = X_2 + X_3$  are both affected by  $X_2$  and are therefore dependent. In addition, each  $V_n$  can take value 2 and is therefore not Bernoulli.
4. No, because  $W_1$  can take value  $-1$  and therefore is not a Bernoulli random variable.


*You have used 1 of 1 submissions*

Exercises 23 due May 11, 2016  
at 23:59 UTC 

**Solved problems**

**Additional theoretical  
material**

**Problem Set 9**

Problem Set 9 due May 11,  
2016 at 23:59 UTC 

**Unit summary**

► Unit 10: Markov  
chains

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