Bookmarks

- Introduction
- 1. Probability and Inference

Introduction to Probability (Week 1)
Exercises due Sep 22, 2016 at 02:30 IST

Probability Spaces and Events (Week 1)
Exercises due Sep 22, 2016 at 02:30 IST

Random Variables (Week 1)
Exercises due Sep 22, 2016 at 02:30 IST

Jointly Distributed Random Variables (Week 2)
Exercises due Sep 29, 2016 at 02:30 IST

Conditioning on Events (Week 2)
Exercises due Sep 29, 2016 at 02:30 IST

Exercise: The Expected Value of a Random Variable

(2/2 points)

- Suppose that a student's score on a test will be 100 if she studies the week before, and 75 if she does not. Suppose also that the student's probability of studying the week before is 0.8. What is her expected score? (Please provide an **exact** answer.)

  95 ✔ **Answer:** 95

- Let's look at why the expected value of a random variable is in some sense a “good" average value. Let X be the result of a single fair six-sided die with faces 1 up through 6.

  Simulate 10,000 rolls of the die roll in Python and take the average of the faces that appeared. What do you get? (Just make a note of it. There's no answer box to enter this in.)

  What is $\mathbb{E}[X]$? (Please provide an **exact** answer.)

  3.5 ✔ **Answer:** 3.5

You should notice that the average you get in simulation should be very close to $\mathbb{E}[X]$, and in fact, if you increase the number of rolls, it will *tend* to get closer (it doesn't necessarily have to get closer when you do each additional roll but the trend is there as you just keep increasing the number of rolls).

Solution:

- Suppose that Alice's score on a test will be 100 if she studies the week before, and 75 if she does not. Suppose also that Alice's probability of studying the week before is 0.8. What is her expected score?

  Solution: Alice's score is 100 with probability 0.8 and 75 with probability 0.2. Thus, her expected score is

$$0.8 \times 100 + 0.2 \times 75 = \boxed{95}.$$

- There are various ways to simulate the die roll in Python code.

  Here's one way:

```
import comp_prob_inference
p_X = {i: 1/6 for i in range(1, 7)}
num_samples = 10000
print(np.mean([comp_prob_inference.sample_from_finite_probability_space(p_X) for n in
range(num_samples)]))
```

  Running that, typical values are close to 3.5.

Towards Infinity in Modeling Uncertainty (Week 4)
Exercises due Oct 13, 2016 at 02:30 IST

Homework 3 (Week 4)
Homework due Oct 13, 2016 at 02:30 IST

What is $\mathbb{E}[X]$?

Solution: X is 1 through 6 each with probability 1/6, so

$$\mathbb{E}[X] = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = \boxed{3.5}.$$

You have used 1 of 5 submissions