

Homework 3

February 7th
Due February 14th

Your assignment may be handwritten or typeset, but in any case it should be neat and readable. Your name, class number and assignment number should be clearly visible (like on this document for example). Multipage assignment must be stapled.

You are encouraged to work in groups for this assignment. However, the redaction should be done on one's own: do not copy some other student's work, or give your assignment to some other student. To consult textbooks or online resources is fair game; on the other hand, to look up the exact exercise and its solution is not. I will be available at my office hours¹ to help you through your reading, or if you need clarifications on an exercise statement.

Reading

The class textbook is *Notes on Elementary Probability*, by Liviu I. Nicolaescu. You will find it on the [course website](#).

Section 1.2. We have gone through this section in class. Please read through it, Example 1.28 is not mandatory. There are a few subtle examples; please see me during office hours if you have trouble understanding what is going on.

Section 1.3. We have covered enough material so that you would be able to read this section up to example 1.48 (included). It was, for the most part, required reading in the first homework. Feel free to read though it, although I would advise against Proposition 1.43 and the following Remark 1.44.

Exercises from the book

Included in this homework are exercises 1.20, 1.21, 1.22, 1.25, 1.26, 1.27, 1.2 and 1.30.

Hint for 1.27: What is the probability of the second ball being green if we draw two balls for U_k ?

¹Monday and Thursday, from 10:00 to 11:30, or by appointment.

Exercise 1

Your dog has a simple life while you are away. There are five things it can do: watch out the window, nap, play with his toys, eat its food, and... eat the couch.

Your dog does three activities in the day, one after the other (for instance nap, then nap, then play), and forgets all about it once it has changed. Here is its thought process.

- At the beginning of the day, or when it just had a nap, it has an equal chance to watch out the window, nap or play.
- When it just played with his toys, it's tired. It might, with equal probabilities, have a nap, watch out the window, or eat something (not the couch).
- When it just spent some time looking out the window, it is getting bored. Maybe this gives it motivation to play (45%), or maybe it will lose interest and have a nap (45%). Or maybe the frustration will make it eat the couch (10%).
- When it just ate, it is satisfied and will have a nap.
- When it just ate the couch, it becomes impossible to predict its behaviour.

What is the probability that, when you come back, your dog ate the couch?

Hint: The way I did it involves paying attention to the dangerous activity of looking out the window.