

# CS 2802: Homework 9

April 27, 2020

Handed out April 27, due May 4

- Read Chapter 20.1–20.3 in MCS and Chapter 13.3-13.4 in the handout from Rosen on finite automata.
- Do the following problems:
  - 20.2(a), (b) (Again, carefully specify the sample space, the probability on it, and the relevant random variables on it.)
  - 20.7
  - 13.3, 8 (If you think it's true, prove it. If you think it's false, give a counterexample.)
  - 13.3, 12 (just a “yes” or “no” suffices; no proof needed)
  - 13.3, 14
  - 13.3, 16 (just state the language in the next three exercises; no need for a proof of correctness)
  - 13.3, 18
  - 13.3, 20
  - 13.3, 23
  - 13.3, 25
  - 13,3, 39
  - 13.3, 43 (just state the language in this exercise and the next)
  - 13.3, 45
  - 13.3, 52
  - Extra problem: Give an inductive definition of the set of regular expressions (in the spirit of the inductive definition that was given for transitive closure) and show that it is equivalent to the one given in the class notes.

- Challenge problem (you don't have to hand this in): I can't resist pointing out this one. Each week, on the site [fivethirty.com](https://fivethirty.com), there's a column called "The Riddler" that has two puzzles ("Riddler Express" and "Riddler Classic"). This week's Riddler Classic is a fun variant of the Monty Hall problem. You can find it at <https://fivethirtyeight.com/features/can-you-beat-the-goat-monty-hall-problem/>. Note that the first paragraph (which talks about the standard Monty Hall problem and says that the probability that you win if you switch is  $2/3$ ). As you should all know by now, that's not necessarily right! It's right only if you assume that Monty randomizes when he has a choice about which door to amount. You should make that assumption for the variant problem too (although the Riddler puzzle doesn't mention it).

Think about (but don't hand in) 19.12(b), 19.26, 19.27, 19.30, 20.1, 20.2(c). There are lot of things to think about with probability!