CS 2802: Homework 7

March 17, 2019

Handed out March 18, due March 25

- Read Chapter 17, 18.1-18.4

- Do the following problems:

  - 17.2

  - 17.4 (Extra hint: first compute the probability that the first player wins and the second player wins.)

  - 17.6(b),(c),(d) (Parts (c) requires a little calculus, which I assume that you've all had. You can assume that $\log(1 - x) \approx -x$, which follows from the Taylor series for log.) For (d), remember that $a^x = e^{\log_e(a)n}$ and that $\log(1 + x) = 1 + x + x^2/2 + \cdots$.)

  - 17.9 (We did the Difference Rule and the Inclusion-Exclusion Rule in class; you should just do the other three. You can use the two that we already did in your proof.)

  - 18.2 (you don't need to explain your answer for (a) and (b), but you do need some explanation for part (c)).

  - 18.5. (You don't have to use the four-step method or give a tree diagram, but you do have to give a careful explanation whatever you do.)

- Additional problem: Show that for every integer n there is a multiple of n that has only 0s and 1s in its decimal expansion. (For example, for 2, $2 \times 5 = 10$; for 3, $3 \times 37 = 111$; for 4, $4 \times 25 = 100$. (There's a short cute answer, but it's not so easy to find. Hint: use the pigeonhole principle.)