

CS 2802: Homework 8

October 18, 2020

Handed out Oct. 19, due Oct. 26

- Read Chapter 15, Chapter 17
- As usual (a) even if the problem doesn't explicitly ask you to do it, you should EXPLAIN your answer and (b) you don't have to calculate the factorials. It's fine just to write, for example, $\binom{7}{3}$, without working out what that is.
 - 15.29
 - 15.36(a) (Hint: First think about the number of ways of doing this if the x_i s just have to be non-negative, rather than being positive.)
 - 15.38
 - 15.39 (b), (c)
 - 15.57
 - 15.66 (explain how you got your answer in part (b)–(e))
 - 17.2
 - 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 $a^x = e^{\log_e(a)x}$ and that $\log(1 + x) = 1 + x + x^2/2 + \dots$)
 - 17.9 (We did the Complement 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.)
 - Challenge problem (no need to hand this in).
 - (a) For a natural number $n > 1$, given an expression that describes how many ways there are of writing n as the product of two positive integers m_1 and m_2 with $m_1 \leq m_2$. If n is prime, there is exactly one way of doing this ($1 \times n$). I'm looking for a general expression, for an arbitrary n .
 - (b) How many ways can you write 1400 as a difference of squares? (There's a reason that I'm asking these questions at the same time.)
- For recitation: 51.36, 15.39, 17.6