Math 142, problem set 07
Outline due: Thu Oct 27
Final version due: Mon Oct 31

For all of the following problems, explain/justify your answer, and write your final numerical answer as a sum or product of factorials, $\binom{n}{k}$, and so on.

Problems to be turned in:

1. Find the coefficients of x^{27} and x^{28} in $(1 + x^2 + x^4 + x^6)^7$.

2. Find the coefficient of x^{23} in $(1 + x)^7 \left(\frac{1}{1 - x^4}\right)^5$.

Use generating functions to solve problems 3–5.

3. At Gygax's Dice Emporium, you can buy as many individual (and identical) 4-sided, 8-sided, 12-sided, and 20-sided dice as you like. You can also buy a large number of (identical) 6-sided dice, but they only come in packs of 6. How many ways are there to buy 29 dice at Gygax's Dice Emporium?

4. At the restaurant Nigiri-Only Sushi, you can order as many as you like of the standard types of nigiri (single sushi): tuna, salmon, yellowtail, ebi (cooked shrimp), tamago (egg), and unagi (eel). There are also more specialized types where there is a limit of one nigiri per order: beluga caviar, deep sea perch, red trumpet fish, and fugu (pufferfish). How many ways are there to order 18 nigiri at Nigiri-Only?

5. The California Counties Forum (CCF) has 3 representatives from each of Calilfornia's 58 counties. If we treat the 3 representatives from a given county as identical, how many ways are there to form a CCF subcommittee with 23 members?

6. (a) Chicken McNuggets can be ordered in packs of 6, 9, and 20. Find the generating function for a_r, the number of ways you can order a total of r McNuggets.

   (b) Find the largest r such that $a_r = 0$. What does that mean in terms of McNuggets?

7. (6.3) 8.