2001 DISCRETE MATHEMATICS
HOMEWORK 6
DUE 2025 APRIL 12

PROBLEM 1 (S8, 2 POINTS)

a. What is the coefficient of x^{12} in $(x-2)^{16}$?

b. What is the coefficient of x^5 in $(x+1)^{10} + (x-1)^{11}$?

PROBLEM 2 (S8, 3 POINTS)

How many elements of the set $\{\, n \in \mathbb{N} \mid 1 \leq n \leq 700 \,\}$ are multiples of 3, 7, or 11?

PROBLEM 3 (S8, 2 POINTS)

An *anagram* of a word is a rearrangement of its letters, whether or not that results in another English word. For example, both "seal" and "aels" are anagrams of "sale". How many anagrams are there of "sesquipedalian"? (Hint: You need to do more than count a number of permutations because some letters are repeated.)

PROBLEM 4 (S8, 3 POINTS)

Prove that if $j \leq k \leq n$ then

$$\binom{n}{k}\binom{k}{j} = \binom{n}{j}\binom{n-j}{k-j}.$$