Practice Final Problems

The final exam will have 5 problems. One of the problems will be true and false questions and one will be a homework problem. The final is comprehensive and will cover the following chapters in Biggs “Discrete Mathematics”:

Chapters 11.3, 11.6, 11.7, 13.4, 13.5, 22 (all), 23 (all except 23.9), 24 (all), 25.1, 25.3, 26.1, 26.3, 26.4, Rogers-Ramanujan identities.

Here are some practice problems for the second part of the class:

1. Write down the codewords of the cyclic code corresponding to the ideal \((1 + x)\) in \(V^3[x]\) and find the parity-check matrix for this code.

2. Let \(C_1\) and \(C_2\) be cyclic codes of the same length \(n\). Show that \(C_1 + C_2 = \{x \in V^n \mid x = c_1 + c_2 \text{ for } c_1 \in C_1, c_2 \in C_2\}\) is a cyclic code. Prove that the generator of this code is the gcd of the generators of \(C_1\) and \(C_2\).

3. Show that the generating function of partitions with distinct parts is

\[ D(x) = \prod_{i=1}^{\infty} (1 + x^i). \]