T-79.5201 Discrete Structures, Autumn 2006

Tutorial 5, 8 November [Note the date!]

1. Verify that the operators corresponding to the combinatorial marking and composition constructions are the same for egf's as for ogf's, i.e. for marking $\hat{c}(z) = zD\hat{a}(z)$ and for composition $\hat{c}(z) = \hat{a}(\hat{b}(z))$.

2. Denote by $b_n^{(r)}$ the number of partitions of the set $[n] = \{1, \ldots, n\}$ where each class contains at most r elements. (Each class must of course by definition be nonempty.) Determine for the sequence $\langle b_n^{(r)} \rangle$ its exponential generating function $\hat{b}^{(r)}(z) = \sum_{n \geq 0} b_n^{(r)} \frac{z^n}{n!}$.

3. Determine the egf's for the classes of permutations where (a) all the cycles are of length three, (b) all the cycles are of even length.