

HOMEWORK 5

For the following languages 1) write an unambiguous formal grammar 2) compute the generating function for the number of words of length n , 3) compute the generating function for the number of indecomposable words of length n , 4) verify the Lagrange's equation (if applicable).

Problem 1 (LGF 5.8). a) $\{a^{3i}b^i \mid i \geq 0\}$, b) the set of palindromes in the three letter alphabet. (A *palindrome* is a word that reads the same from the left to the right and from the right to the left, like “kayak”.)

Problem 2 (LGF 5.2, 5.10). All the words of letters a and b *not* containing a) subword aa , b) subword ab , c) subword aaa , d) subwords $aabab$ and $ababa$.

Problem 3 (LGF 5.5). The *Motzkin language*, which is the language in the alphabet $\{a, b, c\}$ consisting of words such that deleting all letters c in it produces a word from the Dyck language. The words in the Motzkin language are in one-to-one correspondence with Motzkin paths.