

Exercise for Analysis of Algorithms

Exercise T14

Use the symbolic method to calculate the number of words of length n that can be created by the following grammar:

$$P \rightarrow \text{😄} P \text{😄} \mid \text{🤖} P \text{📺} \mid \text{💩} \mid \text{💩} P$$

Exercise T15

Find a bivariate generating function and a closed-form expression for the number of bitstrings of length n that contain exactly m ones and do not contain the substring 11.

Exercise H10

Use the symbolic method to calculate the number of words of length n that can be created by the following grammar:

$$\begin{aligned} Q &\rightarrow \text{😄} P \text{😄} \\ P &\rightarrow PQ \mid \varepsilon \end{aligned}$$

Hint: Use the sequence operator.

Exercise H11

Find a generating function for the number of trees with exactly n internal and m external vertices $T_{n,m}$. For what values of n, m do we have $T_{n,m} = T_{m,n}$?

Hint: Do not do all the computations by hand. Seek the help of a computer algebra system. `maxima` can solve quadratic equations and can find the coefficients of a generating function via Taylor expansion.