

# Sequence Analysis SS 2015

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## *Exercise 1. ( $Q$ -gram threshold)*

Formulate an ILP finding the optimal threshold for the  $Q$ -gram #-# on the fixed  $(m, k)$ -mismatches instance  $(9, 2)$ , write it to a file and solve it with an ILP solver.

## *Exercise 2. ( $Q$ -gram coverage)*

Compute the minimum coverage of the  $Q$ -gram #-# on the fixed  $(m, k)$ -mismatches instance  $(9, 2)$ . Hint: you can enumerate all meaningful combinations, or try to formulate and solve an ILP.

## *Exercise 3. ( $Q$ -gram families)*

Construct an example of  $Q$ -gram family consisting of two  $Q$ -grams where, on a fixed  $(m, k)$ -mismatches instance, the individual  $Q$ -gram thresholds are 0 but their sum is at least 1. Hint: you can try instance  $(9, 1)$  and fix  $w(Q) = 5, s(Q) = 7$  for both  $Q$ -grams.