

## Parameterized Algorithms Tutorial

The purpose of this tutorial is to get more practice with color-coding. Use color-coding to design a randomized FPT-algorithm for each of the following problems. In each case, calculate the expected running time of your algorithm.

### Tutorial Exercise T28

The  $k$ -CYCLE problem: given an undirected graph  $G = (V, E)$  and an integer  $k$  as parameter, decide whether  $G$  has a cycle of length at least  $k$ .

### Tutorial Exercise T29

The  $k$ -EDGE DISJOINT TRIANGLES problem: given an undirected graph  $G = (V, E)$  and an integer  $k$  as parameter, decide whether  $G$  has  $k$  edge-disjoint triangles.

### Tutorial Exercise H30

The  $k$ -VERTEX-DISJOINT  $K_4$ S problem: given an undirected graph  $G = (V, E)$  and an integer  $k$  as parameter, decide whether  $G$  has  $k$  vertex-disjoint  $K_4$ s.