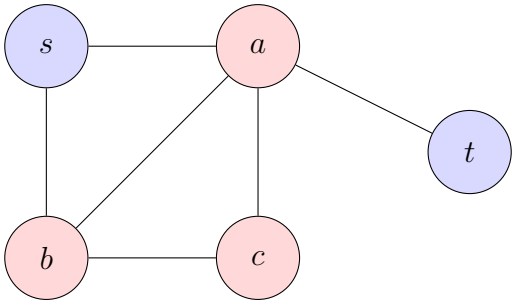
Walking

This is a **regular task**. You must submit a PDF, which can be produced using the LaTeX template on Moodle, exported from a word processor, hand-written or any other method.

You have a simple, unweighted, undirected and connected graph $G = (V, E)$ with n vertices and m edges. You are also given two particular vertices s and t and an integer k. A *walk* of length $r - 1$ is a sequence of vertices $[v_1, v_2, \ldots, v_r]$ such that $\{v_i, v_{i+1}\} \in E$ for $i = 1, 2, \ldots, r - 1$. A walk may include the same vertices or the same edges multiple times.

Design and analyse an $O(km)$ algorithm that counts the number of walks from s to t that use exactly k edges. You do **not** need to list the walks.

For example, if G is the graph shown below and $k = 4$, the answer is 6. The 6 walks from s to t using 4 edges have vertex sequences *sasat*, *sbsat*, *sbcat*, *sabat*, *sacat*, and *satat*.



Note: All graphs in this course are assumed to be simple and connected, and provided as an adjacency list (unless otherwise stated).

Advice.

See the advice for previous weeks regarding what to include in a solution using dynamic programming.

Expected length: about half a page.