Online Motion Planning, SS 17
Exercise sheet 4
University of Bonn, Inst. for Computer Science, Dpt. I

- *You can hand in your written solutions until Tuesday, 16.5., 14:15, postbox in front of room E.01 LBH.*

- *We allow (and recommend) fixed groups of 2 students.*

- *Please subscribe to our mailing list:*
  https://lists.iai.uni-bonn.de/mailman/listinfo.cgi/vl-online

Exercise 10:   Number of visits   (4 points)

a) Consider the Plegde Algorithm without sensor errors in a polygonal environment with n edges. Show that the algorithm can visit a *single* edge $\Omega(n)$ times, even when the agent escapes from the labyrinth.

b) Assume that at the start of the Pledge Algorithm the number of edges of the polygonal environment is given. Is it possible to calculate a threshold k, so that after more than k edge visits, the agent knowns that it can never leave the scene?

Exercise 11:   CFS Offline cost   (4 points)

During the execution of the CFS algorithms there are some *offline* computational cost: Categorize the corresponding tasks and analyse the running time for the input numbers $|E|$ and/or $|V|$, respectively.

Exercise 12:   **Pebble is necessary**   **(4 points)**

In the mapping model, the agent cannot recognize an already visited vertex or edge. The agent only sees the outgoing edges in a given order at each vertex.

a) Give a formal argument that a pebble is necessary for the exact mapping of a graph. Make use of the graphs shown in Figure 1.

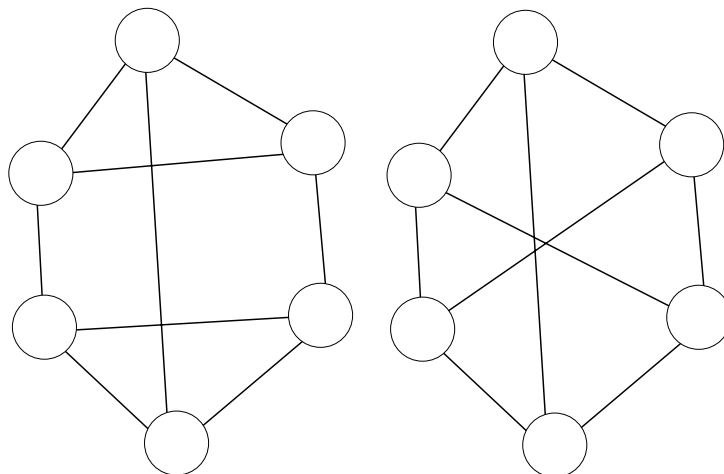b) Apply the marker algorithm to one of the graphs below, start at the topmost vertex. Consecutively, number the vertices and edges that are detected.

Figure 1: Why is a pebble necessary?