

Online Motion Planning, SS 16
Exercise sheet 11
University of Bonn, Inst. for Computer Science, Dpt. I

- *You can hand in your written solutions until Wednesday, 13.07., 14:15, postbox in front of room E.01 LBH.*

Exercise 31: Certificate Approximation by spirals (4 points)

Consider the online approximation of the certificate path. Assume that you have the information, that the angle α_x of the unknown certificate of length $x(1 + \alpha_x)$ has size at most $\pi/2$.

1. What approach would you suggest for obtaining an efficient spiral strategy for covering any such certificate?
2. Compute the ratio of the best spiral and present its eccentricity.

Exercise 32: Online search ratio approximation fails (4 points)

We are searching for a point on an unknown *directed* graph $G = (V, E)$ with unit length edges. The goal can be located at the vertices or on the edges. The agent sees the next outgoing edges only after the visit of the corresponding vertex and can build a map.

Give a counter example that shows, that a constant online approximation of the optimal search ratio cannot be guaranteed.

Exercise 33: Online search ratio approximation (4 points)

We are searching for a point on a binary tree with positive edge weights. The goal can be located on the edges and the vertices. The agent sees the next outgoing edges and its length only after the visit of the corresponding vertex and can build a map of the tree.

Design a strategy that approximates the optimal search ratio within a ratio of 4. Repeat the analysis for this example.