INFORMATIK

Universität
des
Saarlandes
FR 6.2 Informatik

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Exercises for Online- and Approximation-Algorithms

3. Assignment Due 27. May 2005

Exercise 1 (*Paging Alg.* MARK, 6 *Points*)
Let n be the number of different pages and k be the size of the fast memory. Show that the randomized MARK algorithm from the lecture is H_k-competitive against oblivious adversaries if $n = k + 1$. Hint: Appropriately modify the $2 \cdot H_k$ proof from the lecture.

Exercise 2 (*Paging Alg.* MARK, 6 *Points*)
Again, let n be the number of different pages and k be the size of the fast memory. Show that the randomized MARK algorithm from the lecture is not H_k-competitive against oblivious adversaries in general. Hint: It suffices to give a counterexample for $k = 2$ and $n = 4$.

Exercise 3 (*Self-organizing lists and randomization,* 6 *Points*)
Proof: Let A be a randomized online algorithm for self-organizing lists that is c-competitive against any adaptive online adversary. Then $c \geq 2$ asymptotically. Hint: Compare A to an ADON adversary that serves the requests using a static list with random placement of the elements.