

Math 167: Mathematical Game Theory – Homework 10

Due: March 17, 2017

Exercise 1.

Show that in the **Second case** (i.e. $L < M$) of the game of *Man and Lion* (from the lecture notes of P. Cardaliaguet, page 7) the man can ensure that he will be on the boundary of the arena after a while by enlarging the initial distance between him and the lion.

Exercise 2.

Show that the condition

$$L \left(1 + \frac{1}{(1 - \varepsilon)^2} \right)^{1/2} < M$$

in the **Second case** (i.e. $L < M$) of the game of *Man and Lion* can hold true for an $\varepsilon > 0$ small only if $M > \sqrt{2}L$.

Exercise 3.

Read the remaining parts of the proofs (from the lecture notes of P. Cardaliaguet) about the facts that the considered strategies in the **Second case** (i.e. $L < M$, mind that by the previous exercise, this proof works only if $M > \sqrt{2}L$) and **Third case** (i.e. $L = M$) let the man and the lion achieve their goals.

Exercise 4.

In the **Third case**, while proving that the man can always avoid the capture, show why can we assume (without loss of generality) that the initial position of the man is in the interior of the arena (i.e. not on the boundary).