Quantitative Logics
MDP exercises

David N. Jansen
Radboud Universiteit Nijmegen

March 19, 2013

1. Model your favourite strategic game (or a reasonable fragment of it) as a Markov decision process.

2. Suppose that a Yahtzee player is trying to throw a full house, i.e., he wants to get a pair and a triple. In his first throw, he got an outcome of 2, 2, 2, 2, 5. Draw (the relevant part of) the Markov decision process that models this player's possibilities for the two remaining throws. Try to draw as few states as possible by combining equivalent states.

    (a) What should the player do to maximize his probability to throw a full house?

    (b) What should the player do to maximize the sum of the dice values? (If the final dice do not show a full house, the player gets 0 points instead of the dice values.)

3. Prove that a PCTL formula using the operator EU ("there exists a scheduler such that" combined with unbounded until) can be translated to an equivalent formula that does not contain EU (but does contain AU).