CS221 Fall 2015 Homework [pacman]

Problem 1: Minimax

1a.

$$V_{opt}(s,d) = \begin{cases} Utility(s) & \text{if } IsEnd(s) \\ Eval(s) & \text{if } d=0 \\ max_{a \in Actions(s)} V_{opt}(Succ(s,a),d) & \text{if } Player(s)=a_0 \\ min_{a \in Actions(s)} V_{opt}(Succ(s,a),d) & \text{if } Player(s) \in \{a_1, a_2, \ldots a_{n-1}\} \\ min_{a \in Actions(s)} V_{opt}(Succ(s,a),d-1) & \text{if } Player(s)=a_n \end{cases}$$

At state s, call $V_{opt}(s, d_{max})$ and the order of the turns is $a_0, a_1, a_2, \ldots a_n$

Problem 3: Expectimax

3a.

$$V_{opt,\pi}(s,d) = \begin{cases} Utility(s) & \text{if } IsEnd(s) \\ Eval(s) & \text{if } d=0 \\ max_{a \in Actions(s)} V_{opt,\pi}(Succ(s,a),d) & \text{if } Player(s)=a_0 \\ \sum_{a \in Actions(s)} V_{opt,\pi}(Succ(s,a),d) * \frac{1}{|Actions(s)|} & \text{if } Player(s) \in \{a_1, a_2, \ldots a_{n-1}\} \\ \sum_{a \in Actions(s)} V_{opt,\pi}(Succ(s,a),d-1) * \frac{1}{|Actions(s)|} & \text{if } Player(s)=a_n \end{cases}$$

At state s, call $V_{opt,\pi}(s, d_{max})$ and the order of the turns is $a_0, a_1, a_2, \ldots a_n$