**Prac4**

**Question 2**

1) random ghost vs. minimax pacman python pacman.py -n 5 -l test -p MinimaxAgent Pacman emerges victorious! Score: 488 Pacman emerges victorious! Score: 287 Pacman emerges victorious! Score: 497 Pacman emerges victorious! Score: 500 Pacman emerges victorious! Score: 474 Average Score: 449.2 Scores: Win Rate: Record: 488.0, 287.0, 497.0, 500.0, 474.0 5/5 (1.00) Win, Win, Win, Win, Win

2) random ghost vs. expectimax pacman python pacman.py -n 5 -l test -p ExpectimaxAgent Pacman emerges victorious! Score: 564 Pacman emerges victorious! Score: 564 Pacman emerges victorious! Score: 562 Pacman emerges victorious! Score: 562 Pacman emerges victorious! Score: 564 Average Score: 563.2 Scores: Win Rate: Record: 564.0, 564.0, 562.0, 562.0, 564.0 5/5 (1.00) Win, Win, Win, Win, Win 3) minimax ghost vs. minimax pacman python pacman.py -n 5 -l test -p MinimaxAgent -g MinimaxGhost Pacman emerges victorious! Score: 434 Pacman emerges victorious! Score: 480 Pacman emerges victorious! Score: 480 Pacman emerges victorious! Score: 500 Pacman emerges victorious! Score: 468 Average Score: 472.4 Scores: Win Rate: Record: 434.0, 480.0, 480.0, 500.0, 468.0 5/5 (1.00) Win, Win, Win, Win, Win

4) minimax ghost vs. expectimax pacman python pacman.py -n 5 -l test -p ExpectimaxAgent -g MinimaxGhost Pacman died! Score: -543 Pacman died! Score: -509 Pacman died! Score: -509 Pacman died! Score: -527 Pacman died! Score: -509 Average Score: -519.4 Scores: Win Rate: Record: -543.0, -509.0, -509.0, -527.0, -509.0 0/5 (0.00) Loss, Loss, Loss, Loss, Loss

**Question 3**

1) random ghost vs. minimax pacman In this case, the movement of random ghost is randomly distributed and the direction of next step is in uniform distribution. However, the minimax pacman’s movement are in cumulative distribution. Obliviously, the pacman can’t correctly assume the ghosts’ behavior. 2) random ghost vs. expectimax pacman The movement of ghost is in uniform distribution but the movement of expectimax pacman is in probability distribution. So, the pacman can’t implement the correction assumption of the ghosts’ behavior. 3) minimax ghost vs. minimax pacman The movements of minimax ghost are in cumulative distribution and the same distribution for the movements of minimax pacman. Therefore, the minimax pacman can correctly predict the movements of minimax ghost. 4) minimax ghost vs. expectimax pacman The movements of minimax ghost are in cumulative distribution and the pacman is in probability distribution, so in some cases, the pacman can correctly assume the movement of ghost, while in some other cases the assumption will be wrong.

**Question 4**

Though minimax ghosts don’t share information with others, but for the minimax tree, we only consider one ghost and one pacman. For each ghost, it will rush to the pacman in order to reduce the credits of pacman according to the certain minimax tree. However, the movement of one ghost, will change the gameState and affect evaluation of the minimax tree of another ghost. Therefore, these ghosts will seem as they are cooperating to catch the pacman.