Question 1. Note that Pacman will have suicidal tendencies when playing in situations where death is imminent. Why do you think this is the case? Briefly explain in one or two sentences. (2 points total)

Answer: Because we are using minimax strategy here, assuming the opponent plays rationally, however the ghost is moving randomly, thus the result can be unexpected.

Question 2. In the best case scenario, to what depth would alpha-beta be able to search in the same amount of time? (1 point total)

Answer: 2d

Question 3. In the worst case scenario, to what depth would alpha-beta be able to search in the same amount of time? How might this compare with the minimax agent without alpha-beta pruning? (2points total)

Answer: d, since in worst case we don't get to prune any branches.

Question 4. True or False: Consider a game tree where the root node is a max agent, and we perform a minimax search to terminals. Applying alpha-beta pruning to the same game tree may alter the minimax value of the root node. (1 point total)

Answer: False, since alpha-beta pruning is based on minimax search, just making it more efficient.

Question 5.
(a) True or False: V_M is always less than or equal to V_E. Explain your answer. (2 points)
(b) True or False: If we apply the optimal minimax policy to the game tree with chance nodes, we are guaranteed to result in a payoff of at least V_M. Explain your answer. (2 points)
(c) True or False: If we apply the optimal minimax policy to the game tree with chance nodes, we are guaranteed a payoff of at least V_E. Explain your answer. (2 points)

1. True, because the ghost is moving randomly here, the opponent will only choose a path better than we assume in minimax, so the V_E is always larger or equal to V_M.

2. True, because minimax policy is making the best choice from a rational opponent and now the opponent is not even rational, thus we could only be better, which is at least Vm.

3. False, because minimax is playing too safe, which might not lead to the best possible outcomes and right now the opponent is playing by chance, so expectimax search will give better result here, thus V_E could be larger than the result we get by playing minimax strategy.