**STATISTICS ASSIGNMENT\_9**

**1. You are going to play 2 games of chess with an opponent whom you have never played against before (for the sake of this problem). Your opponent is equally likely to be a beginner, intermediate, or a master. Depending on**

**(a) What is your probability of winning the first game?**

**(b) Congratulations: you won the first game! Given this information, what is the probability that you will also win the second game**

**(c) Explain the distinction between assuming that the outcomes of the games are independent and assuming that they are conditionally independent given the opponent’s**

**skill level. Which of these assumptions seems more reasonable, and why?**

(a) If the opponent is equally likely to be a beginner, intermediate, or a master, then the probability of winning the first game would depend on the player's skill level. Assuming you are an average player, you would have a higher probability of winning against a beginner than against a master, and intermediate would be in between. Let's assume the probability of winning against a beginner, intermediate, and master are 0.8, 0.5, and 0.2, respectively. Then the overall probability of winning the first game would be (0.8 \* 1/3) + (0.5 \* 1/3) + (0.2 \* 1/3) = 0.5.

(b) Given that you won the first game, the probability of winning the second game would change because now you know that your opponent is not a master. The probability of your opponent being a beginner or intermediate would increase. Let's assume the probability of winning the second game against a beginner, intermediate, and master are 0.7, 0.6, and 0.1, respectively. Then the updated probability of winning the second game would be (0.7 \* 1/2) + (0.6 \* 1/2) = 0.65.

(c) Assuming the outcomes of the games are independent means that the result of the second game would not depend on the result of the first game. However, this assumption seems unrealistic because the opponent's confidence, motivation, and strategy would change after the first game. Assuming the outcomes are conditionally independent given the opponent's skill level means that the result of the second game would depend on the opponent's skill level and not on the result of the first game. This assumption seems more reasonable because the opponent's skill level would be the main factor in determining the outcome of the game, and it would not change after one game.