1. In how many ways can I sit 5 people in a circular table?

2. In a simplified version of lotto, a player chooses 6 numbers out 42. If she matches all 6 numbers, she wins the first prize, while if she matches 5 out of those six she gets the second price. What are the probabilities of winning each of these two prizes?

18. Two teams (A and B) are playing a series of 7 baseball games. The winner of the series is the first team to win 4 games. We assume that the outcome of each game is independent of the rest, and that team A wins each game with probability 0.4. Three games have been played so far, and A has won two of them. What is the probability that team A wins the series? Suppose that you and your friend bet $10 dollars on the outcome of the series (you bet to A and your friend to B). How should the money be split if the series stops now?

3. When playing craps, what is the probability of “crapping-out”.

4. When playing craps, if your point is 9, what is the probability that you will win within the next four shots? What is the probability that you will lose within the next four shots?

5. If your point is 6, what is the probability that you will win the round of craps?

6. Consider the following table giving the joint probability for two random variables. Are the events \{X=0\} and \{Y=0\} independent? Are the two random variables independent?

<table>
<thead>
<tr>
<th>X/Y</th>
<th>Y=0</th>
<th>Y=1</th>
<th>Y=2</th>
</tr>
</thead>
<tbody>
<tr>
<td>X=0</td>
<td>0.25</td>
<td>0.15</td>
<td>0.10</td>
</tr>
<tr>
<td>X=1</td>
<td>0.25</td>
<td>0.20</td>
<td>0.05</td>
</tr>
</tbody>
</table>

7. “Ignorant Monty”: In a variant of the Monty Hall problem, Monty does not know what lies behind the door and pick one at random to open. When he does, he is relieved that it contains a goat. Show that, in this case, it is irrelevant whether you switch or not.

8. How could you use the martingale doubling system in craps?
9. Explain why, in single-deck blackjack, there is an advantage to the player when a large number of high cards are in the deck.

10. What actions can casinos take to reduce the advantage of card counters in Blackjack (besides beating people up)? Explain the logic behind these actions.

11. You are playing blackjack, and you are the only player on the table. Your hand is K|8 and the dealer shows a 9. If you know that all aces, 2s, 3s, 4s, 5s, and 6s are out of the deck (but all other cards are still in), what is the probability that you will win the hand if you stay?

12. In traditional draw poker (were you are given 5 cards that are unknown to your opponents), what is the probability that you will be dealt a poker in the first hand? If you were allowed to change up to two cards, what would be probability?

13. You are playing five-card stud poker without bring-in and only one opponent is left. You show 2♣3♠Q♠Q♥ and your hidden card is K♠. Your opponent’s open hand is 7♥J♥K♦7♦. What is the probability that you will win the game? How would it change if your hidden card is A♥?

14. In a Texas Hold’em game with only two players, you hand is 8♦J♠, your opponents hand is 8♠10♦ and the hand shown in the table before the river is 2♣K♠8♠Q♥. What is the probability that you win the hand? What is the probability that you will tie?

15. What would be the answer to the previous problem if you only knew one of your opponent’s cards? In particular, what would it be if you only knew that his hand includes 8♦.