Playing Cards

Group Assignment

Blackjack Part II

In the assignment in lesson 1, we made a simulator for playing blackjack. In this assignment, we will further develop the simulator.
Blackjack is a cardgame played with 2 or more players. See the complete rules on
`https://en.wikipedia.org/wiki/Blackjack`

The simple rules are summarized in the assignment from lesson 1.

Points

- Ace - 1 or 11 points
- 2-10 - the value on the card
- knave, queen, king - 10 points.

Questions

The questions will assume that you have already solved the assignment from lesson 1.

1. Let a random variable X_n be the value of the nth card drawn from the deck. Make a drawing for the marginal pmf of X_1.
2. What is the expected value of X_1?
3. If X_1 is value for the first card drawn, and X_2 is for the second, what is the conditional pmf for $p(X_2|X_1 = 10)$?
4. Find the probability $p(X_1 = 10|X_2)$? i.e. $p(1st\ card = 10|value\ of\ 2nd\ card)$.
5. Verify your result from question 1-4 with the Matlab simulator you made in lesson 1.
6. Make a Matlab function that generates the conditional pmf for the value of the nth card drawn from the deck, $p(X_n|X_1 \cdots X_{n-1})$ given the previously drawn cards 1 to $n-1$.
7. What is the expected value of $p(X_n|X_1 \cdots X_{n-1})$, when previous drawn cards have the values [1 2 10 10 1 3 7 7]?
8. Based on previously drawn cards, make a function in matlab that calculates the risk of busting. You need the information on what cards are on the table, and what cards have been drawn from the deck.
9. Devise a new player strategy for the game, based on question 6 and 8.
10. Simulate the new player strategy, and compare it to the strategy devised in lesson 1. If the deck is finished, the cards from previous games are reshuffled and reused.

11. Can the dealer win anything by also revising his strategy?
12. Discuss what would happen if two decks of cards where used?