

Activity 11

Name: _____

Las Vegas Card Games

1. You are playing five-card stud video poker. The possible outcomes and the net gains are given below. These can also be found in the associated Excel file.

Hand	Combinations	Probability	Net Gain
Royal flush	4	0.00000154	50
Straight flush	36	0.00001385	25
Four of a kind	624	0.00024010	20
Full house	3,744	0.00144058	17.50
Flush	5,108	0.00196540	15
Straight	10,200	0.00392465	10
Three of a kind	54,912	0.02112845	5
Two pair	123,552	0.04753902	1
Pair	1,098,240	0.42256903	0
Nothing	1,302,540	0.501177394	-5

a. What is the expected value of the game?

b. Would you be willing to play the game for a long time?

c. If the game were fair, what should the expected value be?

d. Change the value of the “Nothing” Net Gain to make the game fair. Use Guess and Check with Excel. What is the value that you get for the “Nothing” Net Gain?

e. Suppose the game is changed to five-card draw. Will this increase or decrease your chances of winning? Why?

2. A card is dealt from a well-shuffled deck.

a. What is the chance that the card is an Ace?

b. What is the chance that the card is a Spade?

c. What is the chance that the card is the Ace of Spades (an Ace AND a Spade)?

d. What is the chance that the card is an Ace OR a Spade?
Hint: These two events are NOT mutually exclusive.

e. What is the probability that the card is a 10-pt card? (10 or a face card)?

f. Now, suppose two cards are drawn from a large caddy of many decks, so that they are independent of each other. What is the probability of "blackjack" (a "21")?

$P(\text{Ace and a 10-pt card or a 10-pt card and an Ace}) = ?$

g. Suppose the payoff for getting a "blackjack" is 20 times your bet. Is this good? (Hint: make an expected value table)

3. Let's play a game with an ordinary deck of cards. You are going to draw one card from a deck of 52 cards. If you draw a spade, club, or diamond, you win! If you draw a heart, then I win. The pay outs will be the following:

Suit	Payoff
club	\$5
diamond	\$10
spade	\$15
heart	-\$25

a. Compute the expected value for this game.

b. Would you be willing to play this game for a long period of time? Why or why not?

c. Let's actually pretend to play. Open up solitaire, (I know you know how), and start a new game. There should be 7 cards showing. Think of each card as a separate game. Count how many cards there are of each suit. Now re-deal. Again, count the number of each suit you have. Do it a 3rd time, for a total of 21 games. Multiply the total number of each suit you had times the payoff for that suit. Add up the total wins and losses to get the total winnings.

Suit	Deal 1	Deal 2	Deal 3	Total	Payoff	Total wins and losses
Club					\$5	
Diamond					\$10	
Spade					\$15	
Heart					-\$25	
TOTAL	7	7	7	21	Total winnings:	

d. To get the average amount won or lost per game, take your total winnings or losses and divide by 21. How does this compare to the expected value in part a?

Average winnings/ losses per game:

e. Do you think the computer chooses cards fairly? Explain.