

Economics 227 Spring 2010
Assignment Four
Due in class Thursday April 1, 2010
Probability (questions 1-5)

Probability

1. On average, after establishing a point in craps how often will the player make the point and win?
2. A type of crap game called "Four The Money" requires the shooter to throw the dice 4 times without a 7 coming up. What are the odds of throwing the dice:
4 times without throwing a 7?
3 times without throwing a 7?
2 times without throwing a 7?
1 times without throwing a 7?
3. Why is the field bet one of the "worse" bets on the crap table?
4. What are the probabilities of winning on the first roll if an individual is betting on the pass line? What are the probabilities of winning on the first roll if an individual is betting on the don't pass line?
5. It has been suggested that a strategy for winning at craps is to bet on the pass line and if you win, you bet a fixed amount again. If you lose, you double your bet and continue to double your bet until you win (which will happen eventually) thereby beating the house and always walking away ahead. There are at least two problems with this strategy. What are they?

Note: The following questions are not required for the assignment but one or more of them will be on the next exam (not the poker hand question which is presented here only for educational purposes.)

Poker Hands

Poker Hand	Description	Example
Straight Flush	5 cards in sequence in the same suit	Kh Qh Jh 10h 9h
Full House	3 of a kind and a pair	5h 5d 5c 7d 7c
Flush	5 cards of the same suit that are not all in sequence	5h 6h 9h Jh Kh
Straight	5 cards in sequence but not all of the same suit	10d Jh Qc Kc Ah

Three of a Kind	3 cards of the same denomination and 2 unmatched cards	Qh Qd Qs 2h 5c
Two Pairs	2 cards of the same denomination and 2 cards of any other denomination with an unmatched card	Kh Kd 2h 2s 5c
One Pair	2 cards of the same denomination and 3 unmatched cards	Kd Ks 5h 4s 9s

h = hearts, d = diamonds, c = clubs, s = spades

(For examples, 3h = 3 of hearts and Kd = king of diamonds)

If a 5-card poker hand is dealt from a well-shuffled deck of 52 cards (no wildcards), how many different ways can a three of a kind hand be dealt?

If a 5-card poker hand is dealt from a well-shuffled deck of 52 cards (no wildcards), how many different ways can each of the following hands be dealt?

- A straight flush (Note that an ace may be played as either a high or a low card in a straight sequence, i.e. A 2 3 4 5 or 10 J Q K A.)
- A straight (but not a straight flush)
- A royal flush (10 J Q K A)
- Four of a kind
- A full house
- Two pairs
- One pair

Three queens and a pair of any denomination

Professor Parcels bets he can get a "6" in four rolls of a fair die. If he gets a "6" in four throws, you give him a dollar. If he doesn't, he gives you a dollar.

Do you want to play? Yes or No?

Explain your answer.

Who would come out better off if you played this bet over and over and over?
Why?

If you played 1,000 times, how much would Parcels probably win (or lose)?

Professor Parcels bets he can get a "double 6" in 24 throws of a pair of fair dice. If he gets a "double 6" in 24 throws, you give him a dollar. If he doesn't, he gives you a dollar.

Do you want to play? Yes or No?

Explain your answer.

You are playing a board game. When it is your turn you flip a fair coin and then roll a fair die. If "heads" comes up you move as many fields as the die shows. If "tails" comes up you move twice as many fields as the die shows.

What is the probability of moving at least 5 fields?

What is the probability of moving at least 5 fields given you rolled a "3"?

What is the probability you rolled a "3" given that you moved at least 5 fields?

Say we want to do a survey of undergraduate students at Whitman. It is known that 35% of the students are firstyear, 26% are sophomores, 22% are juniors and 17% are seniors. 75% of the firstyear say they like to eat in the cafeteria, versus 62% of the sophomores, 55% of the juniors and 40% of the seniors. If we randomly choose an undergraduate student who is eating in the cafeteria, what is the probability he/she is a senior?

Say we pick cards from a standard deck, one at a time.

What is the probability that the first card is a "diamond"?

What is the probability that the first card is a "diamond" and the second card is a "spades"?

What is the probability that the first three cards are all "diamonds"?

We flip a fair coin repeatedly.

What is the probability of three "heads" in a row?

What is the probability that the first flip was heads given that two out of the first three flips were "heads"?

We flip a coin twice. Then we flip it again, as many times as the number of "heads" we got on the first two flips. For example, if we got {H,T} in the first two flips, we flip the coin one more time.

What is the probability of a total of 2 "heads" (after the game is over)?

What is the probability of that the first flip was heads given a total of 2 "heads" (after the game is over)?

You are given two urns, A and B. A contains 4 red marbles, 2 white marbles, and 4 blue marbles. B contains 2 red marbles and 3 white marbles. Toss a fair die; if 2 or 5 appear, then choose a marble from B, otherwise choose a marble from A. What's the probability that you choose:

a red marble?

a white marble?

a blue marble?

Why is gambling illegal with only certain exceptions?