

Math 132
Homework 2
due February 27

February 13

Instructions: Do all of the problems fully. Make sure your name is on every sheet which you turn in. You must offer explanations/justifications for your answers in order to receive credit. Feel free to work with others, but you must turn in your own homework.

1. We have now had class for three weeks, and you have turned in the first assignment. I am thus in the process of evaluating you. I would like you to evaluate me: go to the course website and use the anonymous feedback form to critique my teaching. It doesn't have to be more than a paragraph; just give me an idea of how I'm doing.
2. In the game of roulette, a wheel with 38 slots is spun and a ball is thrown into the wheel so that it eventually falls into one of the slots. Of the 38 slots, 18 are red, 18 are black, and 2 are green. The red and black slots are also labeled with numbers 1 to 36, while the two green slots are labeled 0 and 00. The payout on red is 1 : 1, that is, if you bet \$1 that the ball will land on red and it does, then you win \$1 (plus your original \$1 back). The payout on black is the same. You can't bet on green. Finally, the payout on each number is 35 : 1, that is, if you bet \$1 on the slot labelled 4 and the ball lands in that slot, then you will win \$35. However, you cannot bet on 0 or 00. (Disclaimer: I made these payouts up. If you go to a casino, don't expect these values to be the same as the casino has.)
 - (a) What is the expected value for playing roulette and betting \$1 on any of the numbers?
 - (b) What is the expected value for betting \$1 on red?

Suppose your friend has the following strategy for roulette: place a \$1 bet on red. If you win, then quit. If you lose, then play two more times, each time betting \$1 on red. No matter what happens in the subsequent two plays, you quit.

- (c) What is the probability that you win money by following this strategy? What is the probability that you lose money? Construct an area model and a tree model to justify your answer.
 - (d) What is the expected value of this strategy?
 - (e) Is this a good strategy or not? Explain.
3. You have two friends, Blaise and Pierre, who are playing the following game: they flip a fair coin, and if it comes up heads, Blaise gets a point, and if it

comes up tails, Pierre gets a point. They have each bet \$5 to play, and the first person to get 10 points wins the whole \$10. At a point where Blaise has 7 points and Pierre has 5, the game gets interrupted, and they can't continue. Blaise feels he should take the whole \$10, as he was ahead. Pierre thinks he should get some money, as he could have made a comeback and won. As you are their friend, they agree to let you decide how to split up the money between them. Come up with the split that is the most fair to both Blaise and Pierre.

4. You are waiting to go to the Badgers' next football game. As you wait for the 80, you count the number of students who are waiting with you, and you find there are 148. In order to get everyone, four buses come by to pick everyone up. You count as people get on, and on the first bus, there are 40 people, on the second bus, there are 33, on the third, there are 25, and on the fourth, there are 50.
 - (a) Suppose you picked a bus at random. What is the expected value for the number of students on that bus?
 - (b) Suppose you picked a student at random. What is the expected value for the number of students on his or her bus?
 - (c) Do you get the same or different answers? If they are the same, explain why. If they are different, explain why.