

## Problem Set 2

1. For the CPS data set, let  $A$  denote the event “wage  $< 13$ ”; evaluate  $P(A)$  and compare this to the conditional probability  $P(A|B)$  where the event  $B$  denotes:
  - (a) individual’s experience  $< 6$ .
  - (b) individual’s education  $\geq 14$ .
2. Newbold, Chapter 5, #13, #15, #19.
3. Recall the bold versus timid play gambling strategies we discussed in class. A person walks into a casino with \$ 900 and decides to bet until he reaches \$1000, or goes broke, whichever comes first.
  - (a) Suppose he bets \$1 at a time on a fair game (50/50 chance of winning). Intuition suggests that if the game is fair, the expected value of his earnings should be 0. What is the probability he goes home a winner?
  - (b) Now consider the more realistic case where the game is not fair to him, but like betting on black in roulette, his chance of winning each round is  $18/38$  (2 green spaces on wheel). It can be shown that the probability of winning by adopting the “girlie-man” strategy of betting \$1 dollar at a time is 0.00003. What is the expected value of his earnings for the night?
  - (c) The “bold” strategy of betting as much as possible in each round until he reaches \$1000, approaches the “fair game” probability. Specifically, it is 0.88. What is the expected value of his earnings by adopting this strategy?
4. **St. Petersburg’s Paradox.** Consider the following gambling game. I flip a coin, and if it’s tail, you get \$1 and the game ends. If it’s a head, the game continues and I flip the coin again. If a tail comes up,

the game ends but you get \$2. If a head comes up the game continues to a third flip. Now, if a tail comes up the game ends and you get \$4, and the game continues if a head comes up. The game continues in this pattern- you get  $\$2^n$  if the first tail occurs on the  $n^{\text{th}}$  flip. Suppose the coin is fair, and sequential coin flips are independent events. How much should I charge you to play so the game is “fair”, in the sense that the expected value of your return is 0?