

Recitation 1
February 8, 2005

1. Problem 1.11, page 55 in the text. We roll two fair 6-sided dice. Each one of the 36 possible outcomes is assumed to be equally likely.
 - (a) Find the probability that doubles are rolled.
 - (b) Given that the roll results in a sum of 4 or less, find the conditional probability that doubles are rolled.
 - (c) Find the probability that at least one die roll is a 6.
 - (d) Given that the two dice land on different numbers, find the conditional probability that at least one die roll is a 6.
2. Problem 1.8, page 53 of text (Bonferroni's inequality).

- (a) Prove that for any two events A and B , we have

$$\mathbf{P}(A \cap B) \geq \mathbf{P}(A) + \mathbf{P}(B) - 1.$$

- (b) Generalize to the case of n events A_1, A_2, \dots, A_n , by showing that

$$\mathbf{P}(A_1 \cap A_2 \cap \dots \cap A_n) \geq \mathbf{P}(A_1) + \mathbf{P}(A_2) + \dots + \mathbf{P}(A_n) - (n - 1).$$

3. Example 1.12 (a) and (b) only, page 27 of text (Monty Hall problem). You are told that a prize is equally likely to be found behind any one of three closed doors in front of you. You point to one of the doors. A friend opens for you one of the remaining two doors, after making sure that the prize is not behind it. At this point, you can stick to your initial choice, or switch to the other unopened door. You win the prize if it lies behind your final choice of a door. Consider the following strategies:
 - (a) Stick to your initial choice.
 - (b) Switch to the other unopened door.

Which is the best strategy?