

MTH U481: Summer 2005: Prof. Malioutov

Assignment 2

Due date: Monday May 16.

Reading: Sections 3.6, 4.1-4.2

Problems: Bayes Rule and Independence

1. p. 83: #26, #27, #29, #34.
2. Consider two events A and B . First, suppose that A implies B . Are A and B independent? Second, suppose that A and B are mutually exclusive. Are A and B independent?
3. p. 85: #36, #37 [this refers to the figures on top of p. 86]
4. An urn contains one red ball and one white ball. One ball is drawn at random. If the selected ball is red, that ball together with two additional red balls are put back in the urn. If the selected ball is white, the ball is returned to the urn. Then a second ball is drawn. Find the probability that both selected balls are red.
5. Two fair dice are rolled. What is the probability that the sum equals 10 given that it exceeds 8?
6. After the Challenger disaster, NASA estimated a chance of 1 in 78 for a similar catastrophic accident during a shuttle flight. If this is correct, what is the probability of at least one accident in the next 20 flights? You should assume independence of accidents.

Random Variables, pmf and pdf

7. Five people, including you and a friend, line up in random order. Let X be the number of people standing between you and your friend. Find the pmf of X .

8. p. 130: #2, #3.

9. The pdf of a continuous random variable X is

$$f(x) = \begin{cases} \frac{3}{4} & 0 \leq x < 1 \\ \frac{1}{4} & 1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

Sketch the graph of $f(x)$. Compute $P(X \leq 1/2)$.