

**Math 2200. Discrete Mathematics.**  
**12.04.08**

**Problem 1.** What is the probability that a die never comes up an even number when it is rolled six times?

**Problem 2.** What is the probability that a five card poker hand contains a flush, that is, five cards of the same suit?

**Problem 3.** What is the probability that a hand of 13 cards contains no pairs?

**Problem 4.** Which is more likely: rolling a total of 9 when two dice are rolled or rolling a total of 9 when three dice are rolled?

**Problem 5.** Find the probability of each outcome when a biased die is rolled, if rolling a 2 or rolling a 4 is three times as likely as rolling each of the other four numbers on the die, and it is equally likely to roll a 2 or a 4.

**Problem 6.** Let  $E$  and  $F$  be two events such that  $p(E) = 0.7$  and  $p(F) = 0.5$ . Show that  $p(E \cup F) \geq 0.7$  and  $p(E \cap F) \geq 0.2$ .

**Problem 7.** Let  $E$  and  $F$  be two events. Prove Bonferroni's inequality:  $p(E \cap F) \geq p(E) + p(F) - 1$ .

**Problem 8.** What is the conditional probability that exactly four heads appear when a fair coin is flipped five times, given that the first flip came up heads?