

**Tutorial 2**  
**Week of February 14, 2005**

1. Problem 55: A parking lot contains 100 cars,  $k$  of which happen to be lemons. We select  $m$  of these cars at random and take them for a testdrive. Find the probability that  $n$  of the cars tested turn out to be lemons.
2. Problem 1.47: We deal from a well-shuffled 52-card deck. Calculate the probability the 13th card is the first king to be dealt.
3. Problem 2.2: You go to a party with 500 guests. What is the probability that exactly one other guest has the same birthday as you? Calculate this exactly and also approximately by using the Poisson PMF. (For simplicity, exclude birthdays on February 29.)
4. Problem 2.24: Variance of the Poisson. Consider a Poisson distributed random variable,  $X$ , with parameter  $\lambda$ , and  $\mathbf{E}[X] = \lambda$  (details on page 90 of text). Compute its second moment and variance.
5. Problem 2.22: Two coins are simultaneously tossed until one of them comes up a head and the other a tail. The first coin comes up a head with probability  $p$  and the second with probability  $q$ . All tosses are assumed independent.
  - (a) Find the PMF.
  - (b) What is the probability that the first coin in the last event is a head? [Note here an event is tossing the two coins simultaneously]