

Problem set 1, due Monday 9/7/2015

1. Bayesian inference

1/10 of the population has a disease. Those with the disease will test positive 3/4 of the time. Those without the disease will test positive 1/4 of the time.

- a) If you test positive, what is the probability that you have the disease?
- b) If you test negative, what is the probability that you have the disease?

2. Combinations

- a) 8 people are trying out for the Bard swim team. 3 will be accepted. (There are no separate positions.) How many distinct teams are possible?
- b) 12 people are trying out for the Bard swim team. 9 will be accepted. (There are no separate positions.) How many distinct teams are possible?
- c) Write and explain the general formula for $\binom{n}{k}$.

3. Invented poker hands

I've invented some new 5-card poker hands. Calculate the probability of being dealt each hand. Insert them into the standard ranking of poker hands accordingly.

- a) "Faces." All five cards are face cards; i.e. any mixture of jacks, queens, and kings; suit not important.
- b) "Court." One king, one queen, and one jack, and any two numbered cards (A through 10).
- c) "Skipping straight." Sequences of cards that skip intervals of one each time, i.e. {A, 3, 5, 7, 9} or {2, 4, 6, 8, 10}. Suit not important. Face cards don't work for this hand.
- d) "Rainbow." Four numbered cards (A through 10) that represent each suit exactly once, plus a face card (jack, queen, or king) of any suit.
- e) "Monochrome." Either all cards are black (spades and clubs), or all cards are red (hearts and diamonds).

Exercises from the book

2.6, 2.10, 2.11, 2.15, 2.26