Stat 230

May 19 Demo/ Practice problems

All the problems are ungraded.

Pr. 1 Pitman 1.6.1

Pr. 2 Pitman 1.6.5

Pr. 3 Pitman 1.6.8

Pr. 4 Write A_i for the event that it rains on day i.

Suppose that A_i satisfy the *Markov condition*[1]:

$$\Pr(A_n|A_{n-1}, A_{n-2}, \ldots, A_2, A_1) = \Pr(A_n|A_{n-1}), n \in \{0, 1, \ldots\},$$

I.e., if we want to predict if it rains tomorrow, we only need to know if it rains today, the rest of the raining history doesn't matter.

a) Use the multiplication rule to write $\Pr(A_1, A_2, A_3, A_4, A_5)$ in terms of $\Pr(A_1)$ and some conditional probabilities.

b) Are the events A_1 and A_5 independent?

c) Is there an event B such that A_1, A_5 are conditionally independent given B? Find such B or argue why there cannot be one.

d) Let $\Pr(A_n|A_{n-1}) = 0.7$ and $\Pr(A_n|A^c_{n-1}) = 0.2$ for all n. It rains today. What is the probability that it rains day after tomorrow?

[1] Such stochastic processes are called *Markov chains*.