

ECONOMICS 6331 – Probability and Statistics, Fall 2005

Homework 2. Wednesday August 31, 2005. Due Monday September 12.

1. (Question 2.3 in Ramanathan.) Let B be an event and A_1, A_2, \dots, A_n be n mutually exclusive events. Define $A = \bigcup_{i=1}^n A_i$. Also assume $P(A_i) > 0$ and $P(B|A_i) = p$ for all i . Show that $P(B|A)$ is also equal to p . [A Venn diagram might help.]

2. (From Midterm 1, Spring 2004, counted 20%) Suppose we have some observations of Texans and Californians. The probability of observing a Texan is $1/3$ and the probability of observing a Californian is $2/3$. Now assume the following (made up numbers), namely that the probability that a Texan is a republican is 40% (so the probability that he is a democrat is 60%, we assume), and the probability that a Californian is a republican is 50% (so the probability that a Californian is a democrat is also 50%).

a) If you select one person from the population according to these probabilities, what is the probability that you will observe a republican from Texas? (Explain how you arrive at you answer)

b) In the model described for Californians and Texans, are the events A: {A person is a democrat} and the event B: {A person is from California} independent events? (Explain how you find the answer).

c) If you select 5 people randomly from the Texans. What is the expected number of republicans?

A study of college students finds that while 60 percent of college students are male, only 40 percent of college students with an A average are male. In contrast, 15 percent of female students have an A average. Assuming these results are accurate answer the following questions.

a) Are “being a male student” and “having an A average” independent? Why?

b) What is the probability that a randomly selected student has an A average?

c) What is the probability that a randomly selected male student has an A average?

3. Ramanathan, question 3.1.

4. Ramanathan, question 3.3.