

ECONOMICS 6331 – Probability and Statistics, Fall 2008

Homework 2. September 2008. Due Monday September 8.

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. A study of college students finds that while 70 percent of college students are male, only 50 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.

- Are “being a male student” and “having an A average” independent? Why?
- What is the probability that a randomly selected student has an A average?
- What is the probability that a randomly selected male student has an A average?

3. (20% of Midterm 1, 2005) Suppose that you consider 3 events: A: You pass the core exam. B: You get an A in statistics. C: The Astros (Houston sports team) wins the World Series. Assume that

$$P(A) = 1/3, P(B) = 1/2 \text{ and } P(C) = 1/5.$$

Further assume that the event C is independent of both A and B (and all subsets of these). Finally, we assume that $P(A|B) = 2/3$.

- What is the probability that you will pass both the core exam and get an A on the statistics exam?
- What is the probability that either the Astros win or you get an A in statistics or you pass the core?
- Assuming that a clairvoyant tells you that you will pass the core. Given that, what will be the probability that you will get an A in statistics?
- What is the probability $P(A \cup C|B)$?

4. Ramanathan, question 2.9.

5. Ramanathan, question 2.10.

6. Ramanathan, Practice question 3.2 on page 30.