1. (Question 2.3 in Ramanathan.) Let $B$ be an event and $A_1, A_2, ..., A_n$ 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.
   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. (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
   $P(A) = 1/3$, $P(B) = 1/2$ 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 $P(A|B) = 2/3$.
   a) What is the probability that you will pass both the core exam and get an A on the statistics exam?
   b) What is the probability that either the Astros win or you get an A in statistics or you pass the core?
   c) 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?
   d) What is the probability $P(A \cup C|B)$?

4. Ramanathan, question 2.9.

5. Ramanathan, question 2.10.