Risk

1. Air safety.
    a. Given the scenario in our air safety discussion earlier, now suppose that if planes were made only 5 times safer, then airplane ticket prices would rise less than before, and thus only 1% of travelers who now fly would choose to drive instead. Assuming all the other data still hold from our discussion, what is the net result on lives lost if we make the planes safer?

    b. Now suppose someone proposes legislation that would reduce the FAA safety requirements, resulting in a 5% increase in airline fatalities. However, the airlines pass on this savings to the consumer with lower ticket prices, resulting in a 15% increase in air travel (and reduction in travel by car). Assuming all other data still hold from our discussion, what is the net result of lives lost if we make the planes less safe?

    c. Suppose the planes could be made 10 times safer with government support, so that airplane ticket prices would rise less and thus only 5% of travelers who now fly would choose to drive instead. Assuming all other data still hold from our discussion, what is the net result of lives lost if we make the planes safer?

2. Suppose a new vaccine that prevents the SARS (Severe Acute Respiratory Syndrome) virus is discovered. Each injection costs $10 and is expected to save 1 in 15,000,000 lives. What is the total cost per life saved for this vaccine? Would you support a government-sponsored program to vaccinate each citizen? Would your response change if a huge epidemic of SARS broke out and the injections would save 1 in 1000 lives?

3. Suppose you are a US Senator and a lobbyist approaches you to report the fantastic news that the group she represents has just discovered a device that will block reception for cell phones in automobiles and thus make driving much safer. The device would cost a mere $100 per vehicle and your lobbyist wants you to offer a bill that would subsidize the expense. What additional information would you need in order to determine the cost per life saved of this gizmo?

4. An eyewitness observes a hit-and-run taxicab accident.
   a. 85% of the cabs in the city are green and 15% are blue. The witness is 100% certain that the cab was blue. Given this information, how likely is it that the cab actually was blue?

   b. 85% of the cabs in the city are green and 15% are blue. The witness is 80% certain that the cab was blue. Given this information, how likely is it that the cab actually was blue?

c. 95% of the cabs in the city are green and 5% are blue. The witness is 80% certain that the cab was blue. Given this information, how likely is it that the cab actually was blue?

5. Recall that, in the United States, approximately 1 person in 1000 is estimated to be HIV-positive. Suppose a person decides to take two independent tests. Test A determines whether or not a person is infected with HIV with 95% accuracy, whereas test B is 99% accurate. Suppose this person learns that both tests came back positive – that is, both predicted that the person was infected with HIV. What is the probability that this person is actually infected?

6. Given the tests from #5 above, assume now that test A came back positive and test B came back negative. What is the probability that this person is actually infected?