1.010 Uncertainty in Engineering
Fall 2008

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Homework Set #2
Due September 25, 2008 (in class)

1. There are three modes of transporting materials from Boston to Chicago: by plane, by highway, and by rail. About half of the materials are transported by highway, 35% by rail, and 15% by plane. The percentages of damaged cargo are respectively 12% by highway, 6% by rail, and 2% by plane.
   a) What percentage of all cargoes may be expected to be damaged?
   b) If a damaged cargo is received, what is the probability that it was shipped by highway?

2. You play *"Monopoly"* with a less experienced friend. The probability you win each game is p=0.6 and the outcomes of different games are independent.
   a) Evaluate the probability of winning 2 games out of 5.
   b) If you play until you win twice and then stop, what is the probability that you play exactly 3 times?

3. The Caspian Sea is a large lake with no outlet. Hence its water level fluctuates widely as a result of anomalous yearly water inflow, precipitation and evaporation. During wet years, the Caspian Sea level (CSL) increases by 0.3m and in dry years it decreases by 0.2m. Given that different years are independently wet or dry with probability P_{wet}=0.4 and P_{dry}=0.6, find the probability mass function of the change in CSL over a period of 4 years.

4. Read Application Examples 3, 4, and 5. (No problem assignment, but you may try on your own.)