## Massachusetts Institute of Technology

# Department of Electrical Engineering & Computer Science

## 6.041/6.431: Probabilistic Systems Analysis (Fall 2002)

#### Tutorial 2

### 1. (THE CHESS PROBLEM)

- (a) i.  $P[2nd Rnd Req] = (0.6)^2 + (0.4)^2 = 0.52$ 
  - P[Bo Wins 1st Rnd] = (0.6)<sup>2</sup> = 0.36
  - iii. P[Al Champ] = 1 P[Bo Champ] P[Ci Champ] = 0.8956
- (b) i.  $P[Bo Challenger|2nd Rnd Req] = \frac{0.36}{0.52} = \frac{9}{13}$ 
  - ii.  $P[Al Champ|2nd Rnd Req] = \frac{0.4156}{0.52} = 0.7992$
- (c)  $P[(Bo \ Challenger)|\{(2nd \ Rnd \ Req) \cap (One \ Game)\}] = \frac{(0.6)^2(0.5)}{0.2920} = 0.6164$

## 2. (TETRAHEDRAL DICE PROBLEM)

- (a)  $P[Sum \text{ of } 8 \text{ appears before sum of } 4 \text{ appears}] = P(8)/(P(4) + P(8)) = \frac{1}{4}$
- 3. A and  $B \cup C$  are not necessarily independent. The following is a counterexample.

Define the following events:

Let A = first toss is H

Let B = second toss is H

Let C =first toss is the same as the second toss

 $P(B \cup C|A) = \frac{1}{2}$ ,  $P(B \cup C) = \frac{1}{4}$ . Then  $P(B \cup C|A) \neq P(B \cup C)$ , so  $B \cup C$  and A are not independent in this case.