Topics Covered in Lecture 4

5-August, 2002

- Sample space
- Probability assignment(axioms)
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$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

- Inclusion-exclusion principle

$$P(\bigcup_{i=1}^{n} A_i) = \sum_i P(A_i) - \sum_{i<j} P(A_i \cap A_j) + \sum_{i<j<k} P(A_i \cap A_j \cap A_k) + \dots$$

- SDP

$$P(\bigcup_{i=1}^{n} A_i) = P(A_1) + P(\bar{A}_1 \cap A_2) + P(\bar{A}_1 \cap \bar{A}_2 \cap A_3) + \dots$$

$$P(A \cup B) = P(A) + P(\bar{A} \cap B)$$

- Combinatorial Problems: Equally likely(finite) sample space

$$P(E) = \frac{|E|}{|S|}$$

- Conditional probability

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

- Independence

$$P(A \cap B) = P(A)P(B) or P(A|B) = P(A)$$

- Series System: Product Law of Reliability
- Parallel System: Product Law of unreliability. Law of diminishing returns.
- Series-Parallel System
- Fault Trees: Alternate routing problem
- Structure Function
- Fault tree with replicated nodes
  1. Boolean Truth table method(State Enumeration)
  2. Inclusion-exclusion
  3. SDP
  4. BDD
  5. Conditioning/Factoring