Problem Set 1.1
Due: Friday September 3, 2004

Exercise 1. Two dice are thrown. Let $A$ be the event that the sum of the faces is odd, $B$ the event of at least one ace. Describe the events $AB$, $A \cup B$, $AB'$. Find their probabilities assuming the all 36 sample points have equal probabilities.

Exercise 2. Verify the following relations.

(a) $(A \cup B)' = A'B'$.

(b) $(A \cup B) \setminus B = A \setminus AB = AB'$.

(c) $AA = A \cup A = A$.

(d) $(A \setminus AB) \cup B = A \cup B$.

(e) $(A \cup B) \setminus AB = AB' \cup A'B$.

(f) $A' \cup B' = (AB)'$.

(g) $(A \cup B)C = AC \cup BC$.

Exercise 3. State which of the following relations are correct and which incorrect:

(a) $(A \cup B) \setminus C = A \cup (B \setminus C)$.

(b) $ABC = AB(C \cup B)$.

(c) $A \cup B \cup C = A \cup (B \setminus AB) \cup (C \setminus AC)$.

(d) $A \cup B = (A \setminus AB) \cup B$.

(e) $AB \cup BC \cup CA \supset ABC$.

(f) $(AB \cup BC \cup CA) \subset (A \cup B \cup C)$.

(g) $(A \cup B) \setminus A = B$.

(h) $AB'C \subset A \cup B$.

(i) $(A \cup B \cup C)' = A'B'C'$.

(j) $(A \cup B)'C = A'C \cup B'C$. 
\((k)\) \((A \cup B)'C = A'B'C.\)

\((l)\) \((A \cup B)'C = C \setminus C(A \cup B).\)

**Exercise 4.** Let \(A, B, C\) be arbitrary events. Find expressions for the events that of \(A, B, C:\)

(a) Only \(A\) occurs.

(b) Both \(A\) and \(B\), but not \(C\) occur.

(c) All three events occur.

(d) At least one occurs.

(e) At least two occur.

(f) One and no more occurs.

(g) Two and no more occur.

(h) None occurs.

(i) Not more than two occur.