

# First Problem Assignment

## EECS 401

Assigned on: January 13, 2006

Due on: January 20, 2006

**PROBLEM 1 (10 points)** Fully explain your answers to the following questions.

- (a) If events  $A$  and  $B$  are mutually exclusive and collectively exhaustive, are  $A^c$  and  $B^c$  mutually exclusive?
- (b) If events  $A$  and  $B$  are mutually exclusive but not collectively exhaustive, are  $A^c$  and  $B^c$  collectively exhaustive?
- (c) If events  $A$  and  $B$  are collectively exhaustive but not mutually exclusive, are  $A^c$  and  $B^c$  collectively exhaustive?

**PROBLEM 2 (5 points)** Joe is a fool with probability 0.6, a thief with probability 0.7, and neither with probability 0.25.

- (a) Determine the probability that he is a fool or a thief but not both.
- (b) Determine the conditional probability that he is a thief, given that he is not a fool.

**PROBLEM 3 (15 points)** Express each of the following events in terms of the events  $A$ ,  $B$  and  $C$  as well as the operations of complementation, union and intersection. In each case draw the corresponding Venn diagram.

- (a) at least one of the events  $A$ ,  $B$ ,  $C$  occurs;
- (b) at most one of the events  $A$ ,  $B$ ,  $C$  occurs;
- (c) none of the events  $A$ ,  $B$ ,  $C$  occurs;
- (d) all three events  $A$ ,  $B$ ,  $C$  occur;
- (e) exactly one of the events  $A$ ,  $B$ ,  $C$  occurs;
- (f) events  $A$  and  $B$  occur, but not  $C$  ;
- (g) either event  $A$  occurs or, if not, then  $B$  also does not occur.