3. Two dice are thrown. Let $E$ be the event that the sum of the dice is odd; let $F$ be the event that at least one of the dice lands on 1; and let $G$ be the event that the sum is 5. Describe the events $EF, E \cup F, FG, EF^c,$ and $EFG$.

6. A hospital administrator codes incoming patients suffering gunshot wounds according to whether they have insurance (coding 1 if they do and 0 if they do not) and according to their condition, which is rated as good $(g)$, fair $(f)$, or serious $(s)$. Consider an experiment that consists of the coding of such a patient.
   (a) Give the sample space of this experiment.
   (b) Let $A$ be the event that the patient is in serious condition. Specify the outcomes in $A$.
   (c) Let $B$ be the event that the patient is uninsured. Specify the outcomes in $B$.
   (d) Give all the outcomes in the event $B^c \cup A$.

8. Suppose that $A$ and $B$ are mutually exclusive events for which $P(A) = .3$ and $P(B) = .5$. What is the probability that
   (a) either $A$ or $B$ occurs;
   (b) $A$ occurs but $B$ does not;
   (c) both $A$ and $B$ occur?

Prove the following relations.

1. $EF \subseteq E \cap E \cup F$.
2. If $E \subseteq F$, then $E^c \subseteq F^c$.
3. $F = FE \cup FE^c$, and $E \cup F = E \cup E^c$.

6. Let $E$, $F$, and $G$ be three events. Find expressions for the events so that of $E$, $F$, and $G$:
   (a) only $E$ occurs;
   (b) both $E$ and $G$ but not $F$ occur;
   (c) at least one of the events occurs;
   (d) at least two of the events occur;
   (e) all three occur;
   (f) none of the events occurs;
   (g) at most one of them occurs;
   (h) at most two of them occur;
   (i) exactly two of them occur;
   (j) at most three of them occur.

12. Show that the probability that exactly one of the events $E$ or $F$ occurs equals
   $P(E) + P(F) - 2P(EF)$.

13. Prove that $P(EF^c) = P(E) - P(EF)$. 