1. **[TYS 2010]**
For events A and B it is given that $P(A) = 0.7, P(B) = 0.6)$ and $P(A|B') = 0.8$. Find
   (a) $P(A \cap B')$, [2]
   (b) $P(A \cup B)$, [2]
   (c) $P(B' \cap A)$. [2]

   For a third event C, it is given that $P(C) = 0.5$ and that A and C are independent.
   (d) Find $P(A' \cap C)$. [2]
   (e) Hence state an inequality satisfied by $P(A' \cap B \cap C)$. [1]

   For (e), try both the 1 mark version (original question) and the 4 mark version (find the 'best possible' inequality for $P(A' \cap B \cap C)$.

2. **[TYS 2015]**
For events A, B and C it is given that $P(A) = 0.45$, $P(B) = 0.4$, $P(C) = 0.3$ and $P(A \cap B \cap C) = 0.1$. It is also given that events A and B are independent, and that events A and C are independent.
   (a) Find $P(B|A)$. [1]
   (b) Given also that events B and C are independent, find $P(A' \cap B' \cap C')$. [3]
   (c) Given instead that events B and C are not independent, find the greatest and least possible values of $P(A' \cap B' \cap C')$. [4]

3. **[TYS 2018]**
The events A, B and C are such that $P(A) = a$, $P(B)b =$ and $P(C) = c$. A and B are independent events. A and C are mutually exclusive events.
   (a) Find an expression for $P(A' \cap B')$ and hence prove that A' and B' are independent events. [2]
   (b) Find an expression for $P(A' \cap C)$. Draw a Venn diagram to illustrate the case when A' and C' are also mutually exclusive events. (You should not show event B on your diagram.) [2]

   You are now given that A' and C' are not mutually exclusive, $P(A) = \frac{2}{5}$, $P(B \cap C) = \frac{1}{5}$ and $P(A' \cap B' \cap C') = \frac{1}{10}$.
   (c) Find exactly the maximum and minimum possible values of $P(A \cap B)$.

4. **[TYS 2011 (modified)]**
A committee of 3 people is chosen at random from a group consisting of 6 women and 4 men. The number of women on the committee is denoted by R.
   (a) Find the probability that $R = 3$. [3]
   (b) Find the probability distribution of R and hence find $E(X)$ and $Var(X)$. [4]
   (c) The most probable number of women on the committee is denoted by r. By using the fact that $P(R = r) > P(R = r + 1)$, show that r satisfies the inequality
   $$(r + 1)!(5 - r)!(2 - r)!(r + 2)! > r!(6 - r)!(3 - r)l(r + 1)!$$
   and use this inequality to find the value of r. [5]