1. Draw the Venn diagram that corresponds to the equations $i)P(A \cap B) = P(B)$ and $ii)P(A \cup B) = P(B)$. in class

2. Suppose the events $A_1, A_2, \ldots, A_k$ are intervals of real numbers such that $A_i = \{x : 0 \leq x < 1/i\}$ for $i = 1, 2, \ldots, k$. Describe the sets $\cup_{i=1}^k A_i$ and $\cap_{i=1}^k A_i$.

   $\cup_{i=1}^k A_i = A_1$ and $\cap_{i=1}^k A_i = A_k$

3. Let A and B be two events. Suppose $P(A) = 0.4, P(B) = 0.5$, and $P(A \cap B) = 0.1$. Find the probability that at least A or B occurs, but not both.

   $P(A \cup B) - P(A \cap B) = P(A) + P(B) - 2P(A \cap B)$

4. Show that $P(A \cap B) \geq P(A) - P(B')$.

$$\begin{aligned}
P(A \cap B) &= P(A) + P(B) - P(A \cup B) \\
&= P(A) + (1 - P(B')) - P(A \cup B) \\
&= P(A) - P(B') + (1 - P(A \cup B)) \\
&\geq P(A) - P(B').
\end{aligned}$$

5. Events A_1 and A_2 are such that $A_1 \cup A_2 = S$ and $A_1 \cap A_2 = \emptyset$. Find p_2 if $P(A_1) = p_1$, $P(A_2) = p_2$, and $3p_1 - p_2 = 1/2$.

   Solve the equations $p_1 + p_2 = 1$ and $3p_1 - p_2 = 0.5$ simultaneously.

   $3(1 - p_2) - p2 = 0.5$ implies $5/8 = p_2$. Plug p_2 into the first equation and solve for p_1.