Problems from Assignment 2

1. Let A, B, be sets. Consider following version of the distributive law for sets:

$$(A \cup B) \cap C = (A \cap C) \cup (B \cap C).$$

   (a) Use a Venn diagram to visualize the above statement.

   (b) Prove the above statement.

2. Consider the following version of De Morgan's :

$$\left(\bigcap_{k=1}^{\infty} A_k \right)^c = \left(\bigcup_{k=1}^{\infty} A_k^c \right)$$

   (a) Use a Venn diagram to visualize the above statement for three sets.

   (b) Prove the above statement in general.

3. Suppose $E_1 \subset E_2$ are events. Let $F = E_2 \setminus E_1$.

   (a) Show E_1 and F are disjoint.

   (b) Show $E_2 = E_1 \cup F$

   (c) Show $P(F) = P(E_2) - P(E_1)$