1. Let \( X, Y \) be subsets of a universal set \( U \). Define \( X' \), the complement of \( X \), and then write down (without proof) one of the two variations of DeMorgan’s Laws.

Solution. The complement \( X' \) is the set of elements \( u \in U \) such that \( u \) is not in \( X \). DeMorgan’s laws are:

(i) \( (X \cap Y)' = X' \cup Y' \).
(ii) \( (X \cup Y)' = X' \cap Y' \).

2. Let \( X \) be a set and \( \sim \) a relation on \( X \). Define what it means for \( \sim \) to be an equivalence relation.

Solution. The relation \( \sim \) is an equivalence relation if:

(i) \( x \sim x \), for all \( x \in X \).
(ii) For all \( x, y \in X \), if \( x \sim y \), then \( y \sim x \).
(iii) For all \( x, y, z \in X \), if \( x \sim y \) and \( y \sim z \), then \( x \sim z \).