The following claim is part of a theorem we have seen in class.
Claim: Let $A$ be a finite set. Any partition of $A$ determines an equivalence relation on $A$ for which the sets in the partition are the equivalence classes.

The proof of this claim considers an arbitrary partition of $A$ with subsets $A_1, A_2, \ldots, A_n$. Based on this partition it defines a relation $R$, and shows that it is an equivalence relation.

1. Define the relation $R$. Be as accurate as possible.
2. Show that $R$ is reflexive.

Answers:

1. $R = \{(a, b): a, b \in A_i, 1 \leq i \leq n\}$, or
   $R = (A_1 \times A_1) \cup (A_2 \times A_2) \cup \cdots \cup (A_n \times A_n)$.

2. For every $a \in A$ there is a subset $A_i$ such that $a \in A_i$. Therefore, $R$ contains $(a, a)$. Since this applies to every $a \in A$ the relation is reflexive.
The following claim is part of a theorem we have seen in class.
Claim: Let $S$ be a finite set. Any partition of $S$ determines an equivalence relation on $S$ for which the sets in the partition are the equivalence classes.

The proof of this claim considers an arbitrary partition of $S$ with subsets $S_1$, $S_2$, $\cdots$, $S_m$. Based on this partition it defines a relation $R$, and shows that it is an equivalence relation.

1. Define the relation $R$. Be as accurate as possible.
2. Show that $R$ is symmetric.

Answers:

1. $R = \{(a, b): a, b \in S_i, 1 \leq i \leq n\}$, or
   $R = (S_1 \times S_1) \cup (S_2 \times S_2) \cup \cdots \cup (S_m \times S_m)$.

2. Suppose that $(a, b) \in R$. Then $a$ and $b$ are in the same subset, say $S_i$. With $a, b \in S_i$, $(b, a) \in R$. Since this applies to every $(a, b) \in R$, the relation is symmetric.