Recall:

A collection $\mathcal{P}$ of subset of $\Omega$ is a $\pi$-system if it is closed under finite intersection.

A non-empty class of subsets, $\mathcal{L}$, of $\Omega$ is called $\lambda$-system if

1. $\Omega \in \mathcal{L}$,
2. $A, B \in \mathcal{L}$, $A \subset B$ implies $B \setminus A \in \mathcal{L}$,
3. $B_i \in \mathcal{L}, i \geq 1, B_i \subset B_{i+1}$ implies $\bigcup_{i \geq 1} B_i \in \mathcal{L}$.

A non-empty class of subsets, $\mathcal{L}$, of $\Omega$ is called $\lambda'$-system if

1. $\Omega \in \mathcal{L}$,
2. $B \in \mathcal{L}$ implies $B^c \in \mathcal{L}$,
3. if $B_i \in \mathcal{L}, i \geq 1$ and they are disjoint, then $\sum_{i \geq 1} B_i \in \mathcal{L}$.
1. Let $\Omega = 1, 2, 3, 4$, and $\mathcal{P} = \{\{1\}; \{1, 2\}\}$.
   (1) Is $\mathcal{P}$ a $\pi$-system?
   (2) List all the sets of $\sigma(\mathcal{P})$.
   (3) Let $\mathcal{K} = \{\{3, 4\}; \{1, 2, 3, 4\}\}$.
   (4) List all the sets of $\sigma(\mathcal{K})$.
   (5) List all the sets of $\sigma(\mathcal{P}) \cap \sigma(\mathcal{K})$. 
2. Prove that postulates of $\lambda$-system and $\lambda'$-system are equivalent.