Name:
1. Consider a probability space $(\Omega, \mathcal{F}, P)$. Suppose that $A = \lim A_n$ exists, where $A_n \in \mathcal{F}$. Show that

$$\lim_n P(A_n) = P(A).$$
2. Let \((\Omega, \mathcal{F}, P)\) be a probability space. Consider set function on \(\mathcal{F} \times \mathcal{F}\):
\[
\rho(A, B) = P(A \triangle B).
\]
Show that \(\rho(\cdot, \cdot)\) satisfy the triangle inequality, i.e., for any \(A, B, C \in \mathcal{F}\)
\[
\rho(A, C) \leq \rho(A, B) + \rho(B, C).
\]
3. Let $\mu$ be a \textit{finitely} additive finite measure on a field $\mathcal{A}$, let $A_i, i \geq 1$ be disjoint sets from $\mathcal{A}$ such that $A = \sum_{i \geq 1} A_i$ also belongs $\mathcal{A}$. Which one,

\begin{align*}
(a) \quad \mu(A) &\geq \sum_{i \geq 1} \mu(A_i) \quad \text{or} \quad (b) \quad \mu(A) &\leq \sum_{i \geq 1} \mu(A_i),
\end{align*}

is true? Prove that one, and give a counterexample for another.