Law of Total Probability

Assume that $A_1, \ldots, A_n$ form a partition of Ω, with $\mathbb{P}(A_i) > 0$ for all i. Then

$$\mathbb{P}(E) = \sum_{i=1}^{n} \mathbb{P}(E|A_i)\mathbb{P}(A_i).$$

Proof

We proved last time that

$$\mathbb{P}(E) = \sum_{i=1}^{n} \mathbb{P}(E \cap A_i),$$

but this is the same equation!