Math 340 HW 1

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1. 1.1.15: Show that in a countably infinite sample space, it is impossible to assign equal probability to all possible outcomes.

   Proof. Assume there exists a countably infinite sample space where all possible outcomes have equal probability. Let $c \in \mathbb{R}$ and $0 < c < 1$. Then $P(\Omega) = \sum_{i=1}^{\inf} p(\omega_i) = c \inf = \inf$. But $P(\Omega)$ must equal 1 per the definition of the sample space, Ω. Thus, by contradiction, reject the initial assumption and conclude that it is impossible to assign equal probability to all possible outcomes in a countably infinite sample space. $\square$