Discrete Probability (Recap)

Let S be the sample space of an experiment with a finite or countable number of outcomes. We assign probability $p(x)$ to each outcome x. With n possible outcomes x_1, x_2, … and x_n, we have:

i) $0 \leq p(x_i) \leq 1$ for $i = 1, 2, \ldots, n$

ii) $\sum_{i=1}^{n} p(x_i) = 1$

The probability of the event E is the sum of the probabilities of the outcomes in E. $p(E) = \sum_{x \in E} p(x)$

$P(\overline{E}) = 1 - P(E)$

$P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$

$P(E \cap F) = P(E) \times P(F)$ given that E and F are independent

$P(E \cap F) = 0$ given that E and F are mutually exclusive

$P(E \mid F) = P(E \cap F) / P(F)$ conditional probability of E given F

Laplace's definition: $p(E) = \frac{m}{n} = \frac{|E|}{|S|}$ where m is the number of outcomes of E, out of n total outcomes