

# 7/Discrete Probability

## Key Terms and Results

### TERMS

采样空间	<b>sample space:</b> the set of possible outcomes of an experiment	<b>distribution of a random variable <math>X</math>:</b> the set of pairs $(r, p(X = r))$ for $r \in X(S)$	随机变量 $X$ 的分布
事件	<b>event:</b> a subset of the sample space of an experiment	<b>uniform distribution:</b> the assignment of equal probabilities to the elements of a finite set	均匀分布
事件概率	<b>probability of an event (Laplace's definition):</b> the number of successful outcomes of this event divided by the number of possible outcomes	<b>expected value of a random variable:</b> the weighted average of a random variable, with values of the random variable weighted by the probability of outcomes, that is, $E(X) = \sum_{s \in S} p(s)X(s)$	随机变量的期望 值
概率分布	<b>probability distribution:</b> a function $p$ from the set of all outcomes of a sample space $S$ for which $0 \leq p(x_i) \leq 1$ for $i = 1, 2, \dots, n$ and $\sum_{i=1}^n p(x_i) = 1$ , where $x_1, \dots, x_n$ are the possible outcomes	<b>geometric distribution:</b> the distribution of a random variable $X$ such that $p(X = k) = (1 - p)^{k-1}p$ for $k = 1, 2, \dots$ for some real number $p$ with $0 \leq p \leq 1$ .	几何分布
给定F, E 的条件概率	<b>probability of an event <math>E</math>:</b> the sum of the probabilities of the outcomes in $E$	<b>independent random variables:</b> random variables $X$ and $Y$ such that $p(X = r_1 \text{ and } Y = r_2) = p(X = r_1)p(Y = r_2)$ for all real numbers $r_1$ and $r_2$	独立随机变量
独立事件	<b><math>p(E F)</math> (conditional probability of <math>E</math> given <math>F</math>):</b> the ratio $p(E \cap F)/p(F)$	<b>variance of a random variable <math>X</math>:</b> the weighted average of the square of the difference between the value of $X$ and its expected value $E(X)$ , with weights given by the probability of outcomes, that is, $V(X) = \sum_{s \in S} (X(s) - E(X))^2 p(s)$	随机变量 $X$ 的方 差
两两独立事件	<b>independent events:</b> events $E$ and $F$ such that $p(E \cap F) = p(E)p(F)$	<b>standard deviation of a random variable <math>X</math>:</b> the square root of the variance of $X$ , that is, $\sigma(X) = \sqrt{V(X)}$	随机变量 $X$ 的标 准差
	<b>pairwise independent events:</b> events $E_1, E_2, \dots, E_n$ such that $p(E_i \cap E_j) = p(E_i)p(E_j)$ for all pairs of integers $i$ and $j$ with $1 \leq j < k \leq n$	<b>Bernoulli trial:</b> an experiment with two possible outcomes	伯努利实验
相互独立事件	<b>mutually independent events:</b> events $E_1, E_2, \dots, E_n$ such that $p(E_{i_1} \cap E_{i_2} \cap \dots \cap E_{i_m}) = p(E_{i_1})p(E_{i_2}) \dots p(E_{i_m})$ whenever $i_j, j = 1, 2, \dots, m$ , are integers with $1 \leq i_1 < i_2 < \dots < i_m \leq n$ and $m \geq 2$	<b>probabilistic (or Monte Carlo) algorithm:</b> an algorithm in which random choices are made at one or more steps	概率(蒙特卡洛) 算法
随机变量	<b>random variable:</b> a function that assigns a real number to each possible outcome of an experiment	<b>probabilistic method:</b> a technique for proving the existence of objects in a set with certain properties that proceeds by assigning probabilities to objects and showing that the probability that an object has these properties is positive	概率方法