MCL 601
Applied Probability & Statistics
Odd Semester 2021

MANIPAL SCHOOL OF INFORMATION SCIENCES
MANIPAL
(A constituent unit of MAHE, Manipal)

Counting Formula Sheet

Setup	Formula
# of ways to select (*without replacement*) and arrange (*order matters*) n distinct objects # of ways to distribute n distinct objects into n distinct bins with one object per bin	$n!$
# of ways to select (*without replacement, order doesn't matter*) r objects out of n distinct objects # of ways to arrange n objects when one object repeats r times and the other $n-r$ times # of ways to divide n distinct objects into two unlabeled groups of unequal sizes r and $n-r$ # of ways to divide n distinct objects into two labeled groups of specific sizes r and $n-r$	$\binom{n}{r}$
# of ways to select (*without replacement*) and arrange (*order matters*) r objects out of n distinct objects # of ways to distribute r distinct objects into n distinct bins with at most one object per bin	$r!\binom{n}{r}$
# of ways to select (*with replacement*) and arrange (*order matters*) r objects out of n distinct objects # of ways to distribute r distinct objects into n distinct bins	n^r
# of ways to arrange n objects with $r_1, r_2, \ldots, r_k$ repetitions, where $n = r_1 + r_2 + \cdots + r_k$ # of ways to divide n distinct objects into k unlabeled groups of unequal sizes $r_1, r_2, \ldots, r_k$, where $n = r_1 + r_2 + \cdots + r_k$ # of ways to divide n distinct objects into k labeled groups of specific sizes $r_1, r_2, \ldots, r_k$, where $n = r_1 + r_2 + \cdots + r_k$	$\dfrac{n!}{r_1!r_2!\cdots r_k!}$
# of ways to divide n distinct objects into k unlabeled groups with some of equal sizes, say $\underbrace{r_1 = r_2}_{\text{2 groups}}$, $\underbrace{r_3 = r_4 = r_5}_{\text{3 groups}}$, and $r_6, \ldots, r_k$ are different such that $n = r_1 + r_2 + \cdots + r_k$	$\left(\dfrac{1}{2!3!}\right)\left(\dfrac{n!}{r_1!r_2!\cdots r_k!}\right)$
# of ways to select r objects (*with replacement, order doesn't matter*) out of n distinct objects # of ways to distribute r identical objects into n distinct bins # of non-negative integer solutions to the equation $x_1 + x_2 + \cdots + x_n = r$	$\binom{n+r-1}{r}$
# of ways to distribute r identical objects into n distinct bins such that no bin is empty # of positive integer solutions to the equation $x_1 + x_2 + \cdots + x_n = r$	$\binom{r-1}{n-1}$

1.