November 21, 2024

Probability Review

Combinatorics

Permutations = Patterns

all objects

$n!$ $7!$

$= 5040$

7 items
- arrange 4 at a time

${}_7P_4 = 35$

"How many arrangements of "NEMAHA CENTRAL"

$$\frac{13!}{3!\,2!\,2!} = 259{,}459{,}200$$

A E N

Pass codes - Repeat object
Special positions
Draw blanks

6 numbers

10 10 10 10 10 10

$1{,}000{,}000$

Combinations - Groups

${}_nC_r$

Select 1 gentleman + 2 ladies

${}_2C_1 \cdot {}_5C_2$

$= 2 \cdot 10$

$= 20$ committees

PROBABILITY

Combinations

1) Dependent
2) No Order
3) No Repl.

Select 3

Prob of selecting at least 2 people wearing hoodies.

2 hoodies or 3 hoodies

$$\frac{{}_3C_2 \cdot {}_4C_1 + {}_3C_3}{{}_7C_3}$$

$$\frac{12+1}{35} = \frac{13}{35}$$

Indiv. prob

lav, then black, then lav

$$\frac{3}{7} \cdot \frac{3}{6} \cdot \frac{1}{5}$$

$$\frac{1}{35}$$

Not

$$\frac{1}{2} \cdot \frac{4}{5} \cdot \frac{1}{1}$$

Binomial

* 2 possible outcomes
* Indep.

Wording

* Give a probability
* Do same action multiple times

Menu - Prob - Distrib.

binomialpdf — exactly 7 of 9

binomialcdf — at least, at most

Conditional

Trees

If

$$P(A|B) = \frac{P(AB)}{P(B)}$$

(find | knows)

at least one

Prob of wind in Nov. is 55% of days.

What is prob. it will be 3 of the next 5 days.

$${}_5C_2 W^3 C^2$$

$${}_5C_2 (0.55)^3 (0.45)^2$$

What is prob that at least one person wearing a hoodie is picked from this class if 3 students are selected?

0H | 1H 2H 3H

$1 - \text{Prob}(\text{no hoodie wearers})$

0H, 3 others

$1 - \frac{{}_4C_3}{{}_7C_3}$

=

Pick 2 student

Prob(2 hoodies or 2 female)

=

Odds - Find probability first!

Expected Value = (Prob)(Gain/Loss)

Event	Toy	Gum	Coal
Gain/Loss	$-5+0.50$ $=-4.50$	$-.10+0.5$ $+0.40$	$+0.5$
Prob	$\frac{2}{6}=\frac{1}{3}$	$\frac{3}{6}=\frac{1}{2}$	$\frac{1}{6}$

$$(-4.50)\left(\frac{1}{3}\right)+(0.40)\frac{1}{2}+(0.50)\left(\frac{1}{6}\right)$$

$$-1.50+0.2+0.083$$

$$=-1.217$$

Pay $0.50