November 29, 2023

Probability Review

Combinatorics

Permutations – Patterns

all objects

$n!$

$10!$

10 items – arrange 6 at a time

$10P_6$

Nemaha Central

$$\frac{13!}{2!\,3!\,2!} = 37,362,124,800$$

E A N

Pass codes – Repeat object, Special positions, Draw blanks

6 numbers

10 10 10 10 10 10

1,000,000

Combinations – Groups

nC_r

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PROBABILITY

Combinations

1) No Order
2) No Replacement
3) Dependent

Indiv. prob

$\frac{3}{14} \cdot \frac{2}{13} \cdot \frac{5}{12}$

↑ Order

How not to do it

$\frac{1}{4} \cdot \frac{1}{8} \cdot \frac{1}{7}$

Not hoodie, then hood, then hoodie

$\frac{4}{12} \cdot \frac{8}{11} \cdot \frac{7}{10}$

Binomial

2 possible outcomes

Independent (same chance every time)

Wording
1) Gives prob.
2) Repeating same action

Hits 7 out of 10

${}_{10}C_3 H^7 M^3$

${}_{10}C_3 (0.33)^7 (0.67)^3$

Binomialpdf
exact amt

Binomialcdf
at least/at most

Conditional

Draw tree.

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

A: find, B: know

What is prob that at least one person wearing a hoodie is picked from this class if 4 students are selected?

0 H
+4 Not
.20

1 H +3 Not OR 2 H +2 Not OR 3 H +1 Not OR 4H

\+ + +

$1 - \text{Prob}(0H + 4\ \text{Not})$

$1 - \frac{{}_4C_4}{{}_{12}C_4} = 1 - \frac{1}{\quad}$

Pick 2 student

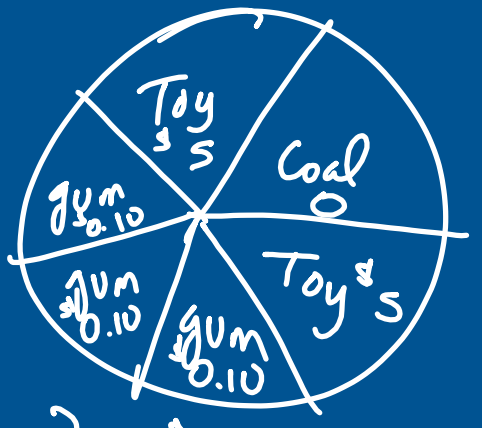
Prob (2 hoodies or 2 female) ← check for duplicates

$$\frac{{}_8C_2 + {}_7C_2 - {}_4C_2}{{}_{12}C_2}$$

Odds – Find probability first!

Expected Value = (prob)(gain/loss)

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



Pay $0.50

Owner's persp.

$(-4.50)(1/3) + (0.40)(1/2) + (0.5)(1/6)$

$= -1.20$