5/

	1 2 3	4, 5	6
prob	$\frac{3}{6}=\frac{1}{2}$	$\frac{2}{6}=\frac{1}{3}$	$\frac{1}{6}$
gain/loss	-1	$3-1=2$	$9-1=8$

$$E.V. = \left(\frac{1}{2}\right)(-1) + \frac{1}{3}(2) + \frac{1}{6}(8)$$

$$= -\frac{3}{6} + \frac{4}{6} + \frac{8}{6} = \frac{9}{6} = 3/2 = \$1.5 \text{ / game}$$ player wins

---

What is prob of selecting someone with eclipse glasses (G) if he/she is a teenager (T)?

$$P(G \mid T) = \frac{P(GT)}{P(T)}$$

? known

April 8, 2024

PROBABILITY REVIEW

Combinatorics — Combinations ↑ groups & Permutations ↑ patterns

List. 1. →

2. 3 conditions to use combinations in prob.

1) No replacement
2) No Order
3) Dependent

#1-15) Ask yourself: Patterns or Groups?

Permutations

1) batting line-ups – 9
How many batting orders? $n!$ $9! = 360,360$

2) 14 players – How many batting orders?

$$nP_r = {}_{14}P_9$$

3) 5 blue NC flags, 5 purple flags
Flags of same color look alike?

$$\frac{\text{total!}}{\text{alik! alik!}} = \frac{10!}{5!5!} = 252$$

4) 4 letters 3 digits

$$\underset{L}{26}\,\underset{L}{26}\,\underset{L}{26}\,\underset{L}{26}\;\underset{D}{10}\,\underset{D}{10}\,\underset{D}{10} = 456,976,000$$

$${}_{10}P_3 = \frac{10!}{7!} = \frac{10 \cdot 9 \cdot 8 \cdot \cancel{7 \cdot \ldots \cdot 1}}{\cancel{7 \cdot \ldots \cdot 1}} = 720$$

$${}_{10}C_3 = \frac{10!}{7!\,3!} \quad \frac{10 \cdot \cancel{9} \cdot \cancel{8} \cdot \cancel{7 \cdot 6 \cdot 5 \cdot \ldots \cdot 1}}{\cancel{7 \cdot 6 \cdot 5 \cdot \ldots \cdot 1} \cdot \cancel{3 \cdot 2 \cdot 1}} = 120$$

Probability

1) Combinations?

2) Binomial — Repeat same action
— Give a prob.
> 2 possible outcomes
> Indep.

3) Individual prob. = $\frac{7}{10} \cdot \frac{3}{9} \cdot \frac{4}{8}$

* Repl.
* Order
* Indep. - with more than 2 possibilities

4) Conditional — must use a prob tree

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

4 track < 2M 2F
3 baseball - 3M
1 softball - 1F

Select 3.

Prob (at least 2 track)

2 T + 1 other OR 3T

$$\frac{{}_4C_2 \cdot {}_4C_1 + {}_4C_3}{{}_8C_3}$$

Pick 2.

$$P(\text{2 males or 2 baseball}) = \frac{{}_5C_2 + {}_3C_2 - {}_3C_2}{{}_8C_2}$$

4 track < 2M 2F
3 baseball - 3M
1 softball - 1F

Prob (track, then softball, then track)

$$\frac{\cancel{4}^{1}}{\cancel{8}^{2}} \cdot \frac{1}{7} \cdot \frac{\cancel{3}^{1}}{\cancel{6}^{2}} = \frac{1}{28}$$

Odds = $\frac{1}{27}$

Prob (clouds) = $\frac{2}{5}$ $\frac{\text{clouds}}{\text{total}}$

odds (no clouds) = $\frac{2}{3} : \frac{3}{2}$

$\frac{\text{no clouds}}{\text{clouds}} = \frac{3}{2}$

32-33

$(2x-4y)^5 =$

1 4 6 4 1
1 5 10 10 5 1

$1(2x)^5(-4y)^0 + 5(2x)^4(-4y)^1 + 10(2x)^3(-4y)^2 + 10(2x)^2(-4y)^3 + 5(2x)^1(-4y)^4 + 1(2x)^0(-4y)^5$

$5 \cdot 2^4 \cdot -4 \qquad 10 \cdot 2^3 \cdot (-4)^2$

$32x^5 - 320x^4y + 1280x^3y^2$

Find the 9th term of $(3x-y)^{11}$

$_{11}C_8 (3x)^3(-y)^8$

$= {}_{11}C_8 \cdot 3^3 \cdot (-1)^8 = +455x^3y^8$