

PROBABILITY REVIEW

1) Write: What is a permutation + a combination?

↑
ways to make patterns

↑
ways to select groups

2) 3 conditions to use combinations:

- All true
- 1) No Replacement
 - 2) No order
 - 3) Dependent

$$\text{Find } {}^9P_2 = \frac{9!}{(9-2)!} = \frac{9!}{7!} = \frac{9 \cdot 8 \cdot \cancel{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}{\cancel{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}} = 72$$

$${}^9C_2 = \frac{9!}{7! \cdot 2!} = \frac{9 \cdot \cancel{8}^4}{\cancel{2} \cdot 1} = 36$$

Permutations	Combinations
1) All = $n!$ $26!$	1) ${}_nC_r$
2) Ways to arrange smaller group ${}_nP_r$ ${}_{26}P_{10}$	
3) 8 backpacks 3 black underwear	
Total: $\frac{8!}{3!} = 6720$ All black! All black!	
4) Repeated objects Special positions	Draw blanks
Locker combinations $25 \cdot 25 \cdot 24$ Even odd Even - cannot repeat 50 numbers	

1 problem: Prob (sleep) = $\frac{8}{9}$ Kanin Odds (does not fall asleep) $\frac{2}{11}$ not sleep

Who is more likely to fall asleep?

$$\begin{aligned} \text{Prob Kayser} &= \frac{8}{9} \\ &= \frac{104}{117} \end{aligned} \quad \begin{aligned} \text{Prob Kanin} &= \frac{11}{13} \\ &= \frac{99}{117} \end{aligned}$$

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Combinations - AND - multiply

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

Indiv.
 $\frac{2}{10} \cdot \frac{3}{9} \cdot \frac{1}{8}$

OR

Binomial
 $7C_2 \left(\frac{3}{5}\right)^2 \left(\frac{2}{5}\right)^1$

- OR = +
Prob of Wearing Sneakers or Prob female

Subtract Duplicates!

$$\frac{9C_2 + 11C_2 - 7C_2}{13C_2}$$

Order
↑
indir
prob

Prob (shots, then, hoodie, then, shorts)

Order $\frac{4}{13} \cdot \frac{5}{12} \cdot \frac{3}{11}$

Binomial = 2 possibilities

- 1) Give prob.
- 2) Action is repeated.

ODDS = Find prob. first!

↑
 $\frac{\text{Suc}}{\text{fail}}$

↑
 $\frac{\text{Succeed}}{\text{total}}$

At least/At Most

Comb.

Select 5 students
Prob (at least 3 juniors)
Dependent.

$3^{\text{jr}} + 2^{\text{others}}$ OR $4^{\text{jr}} + 1^{\text{other}}$ OR 5^{jr}

$$\frac{{}_6C_3 \cdot {}_7C_2 + {}_6C_4 \cdot {}_7C_1 + {}_6C_5}{C}$$

Binomial - Same chance

Win a coupon every day.
Everyone in draw each day.

$${}_5C_2 J^3 O^2 \text{ or } {}_{51}C_4 J^4 O^1 \text{ or } {}_{50}C_5 J^5$$

$$5C_2 \left(\frac{6}{13}\right)^3 \left(\frac{7}{13}\right)^2 +$$

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

$$1(2x)^5(-4y)^0 \quad 5(2x)^4(-4y)^1 \quad 10(2x)^3(-4y)^2 \quad 10(2x)^2(-4y)^3 \quad \dots$$

$$5 \cdot 2^4 \cdot -4$$

$$-320 \underline{x^4 y}$$

Find 4th term

$${}_5C_3 (2x)^2 (-4y)^3$$