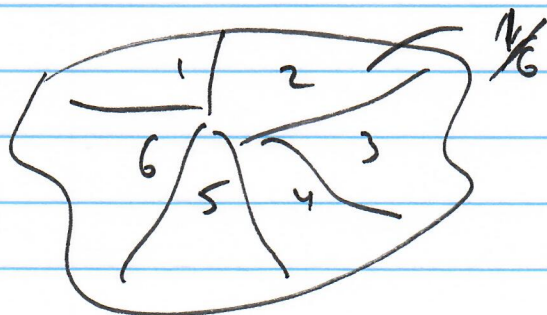
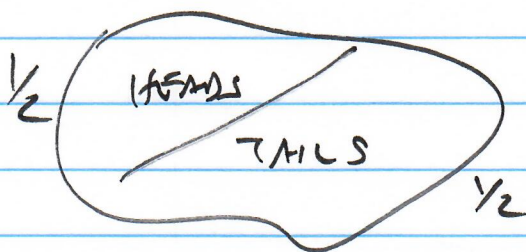
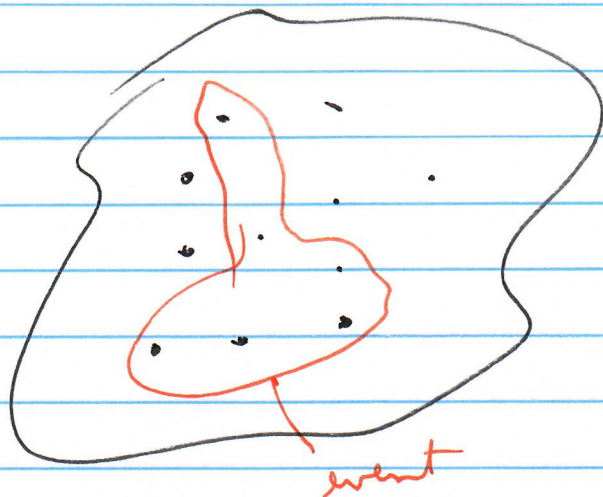
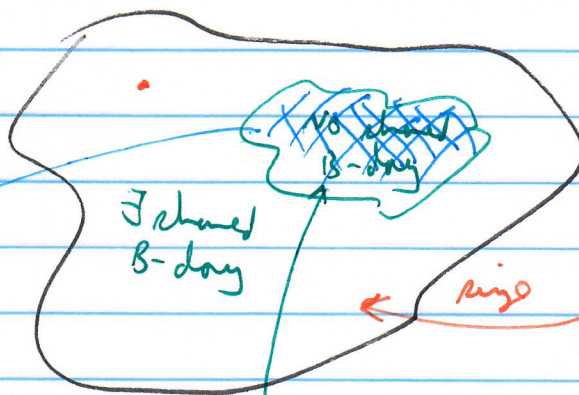


# PROBABILITY



## BIRTHDAY PROB

$n$  people



	B - DAY
$P_1$	<del>1/366</del> 1/1
$P_2$	<del>1/365</del> 1/2
$\vdots$	$\vdots$
$P_n$	<del>1/366</del> 1/31

$$\frac{366!}{(366-n)!}$$

$$366^n$$

$$366 \times 365 \times 364 \dots (366-n+1) = \frac{366!}{(366-n)!}$$

(2)

$$\frac{366!}{(366-n)!} \cdot \frac{1}{366^n}$$

$$= \frac{366}{366} \cdot \frac{365}{366} \cdots \frac{366-n+1}{366}$$

prob of NO  
shared B-day

$$= 1 \left(1 - \frac{1}{366}\right) \left(1 - \frac{2}{366}\right) \cdots \left(1 - \frac{n-1}{366}\right)$$

n	1	...	10	22	23	367
prob	1		.88	.52	.49	0

$$\text{prob}(\text{shared B-day}) = 1 - \text{prob}(\text{no shared B-day})$$

GUID - 128 bits  
 $2^{128}$  GUIDs

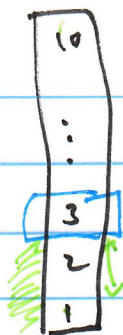
$10^6$  / hour  
 24 hours / day  
 366 days / year  
 100 years

$$10^6 \times 24 \times 366 \times 100 \leq 10^{12}$$

$$\text{prob of NO equal GUIDs} = \left(1 - \frac{2^{128}}{(2^{128} - 10^{12})!} \cdot \frac{1}{(2^{128})^{10^{12}}}\right) < 10^{-38}$$

prob of duplicates





$$p = \frac{2}{9}$$

$$p = \frac{\text{distance from my floor to bottom}}{\text{distance from top floor to bottom}}$$

= prob elevator is below us

$$1 - p = \text{prob elevator is above us}$$

= prob that next elevator is going down

2 elevators

FIRST ONE

