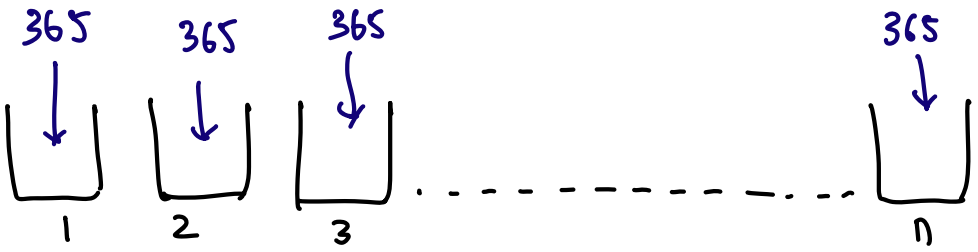
BIRTHDAY PROBLEM

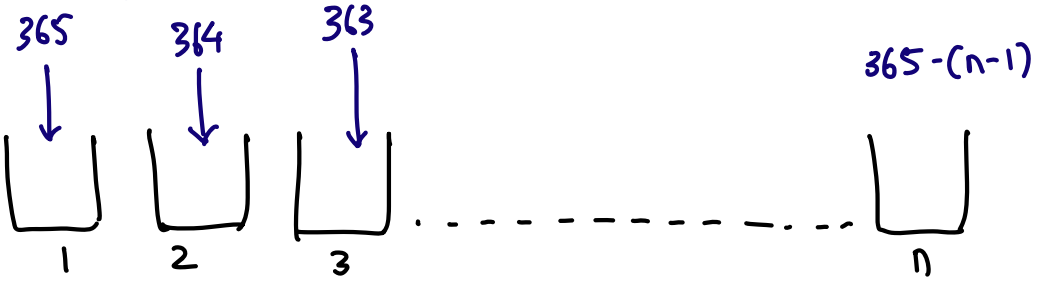
Problem setup: In a room of n people, what is the chance that atleast two people share a birthday?

Assumption: each person is equally likely to be born on any day. (no leap years)



← These bins are people

Total # of outcomes $= 365^n$



← These bins are people

(event A)

Total # of outcomes when no two people share the same birthday is $= 365 \cdot 364 \cdot 363 \cdots 365-(n-1)$

$$P(A) = \frac{365 \cdot 364 \cdot 363 \cdots 365-(n-1)}{365^n}$$

$$= \prod_{i=0}^{n-1} \frac{N-i}{N} \quad ; \quad N = 365$$

$$P(\text{two ppl sharing a birthday}) = 1 - P(A)$$

$$= 1 - \prod_{i=0}^{n-1} \frac{N-i}{N} \quad ; \quad N = 365$$