Brute-forcing a hash function

CR - Collision Resistance

➡ given H, hard to find m and m' such that $H(m) = H(m') = x$

Given a hash function H of n bits output

- Reaching all possibilities
- On average, an attacker should try half of them


m
H
X

2^n cases

2^{n-1} cases

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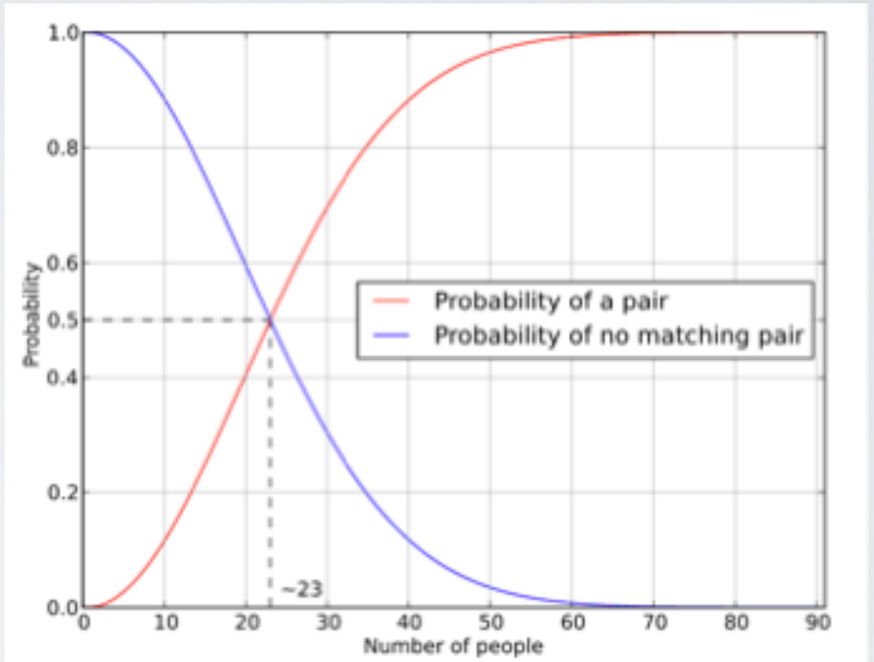
- On average, an attacker should try half of them — 2^{n-1} cases

Birthday Paradox

"There are 50% chance that 2 people have the same birthday in a room of 23 people"



N-bits security

➡ Given a hash function **H** of **n** bits output, a collision can be found in around $2^{n/2}$ evaluations

e.g SHA-256 is 128 bits security