

Computational Complexity



- Given H and m , computing x is **easy** (polynomial or linear)
- Given H and x , computing m is **hard** (exponential)

➔ H is **not invertible**

Preimage Resistance and Collision Resistance



PR - Preimage Resistance (a.k.a One Way)

- ➡ given H and x , hard to find m
e.g. password storage

2PR - Second Preimage Resistance (a.k.a Weak Collision Resistance)

- ➡ given H , m and x , hard to find m' such that $H(m) = H(m') = x$
e.g. virus identification

CR - Collision Resistance (a.k.a Strong Collision Resistance)

- ➡ given H , hard to find m and m' such that $H(m) = H(m') = x$
e.g. digital signatures

CR → 2PR and CR → PR