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)

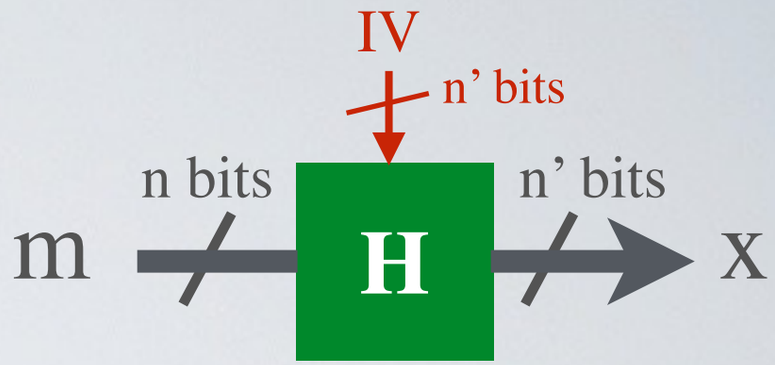
➡ given H, m and x, hard to find m' such that $H(m) = H(m') = x$
e.g. virus identification

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

Common Hash Functions



Name	MD5	SHA-1	SHA-2				SHA-3 (Keccak)			
Variant			SHA-224	SHA-256	SHA-384	SHA-512	SHA3-224	SHA3-256	SHA3-384	SHA3-512
Year	1992	1993	2001				2012			
Designer	Rivest	NSA	NSA				Guido Bertoni, Joan Daemen, Michaël Peeters, and Gilles Van Assche			
Input n bits	512	512	512	512	1024	1024	1152	1088	832	576
Output n' bits	128	160	224	256	384	512	224	256	384	512
Construction	Merkle–Damgård						Sponge			
Speed cycle/byte	6.8	11.4	15.8		17.7		12.5			
Considered Broken	**yes**	**yes**	**no**				**no**			