

**IP=PSPACE**

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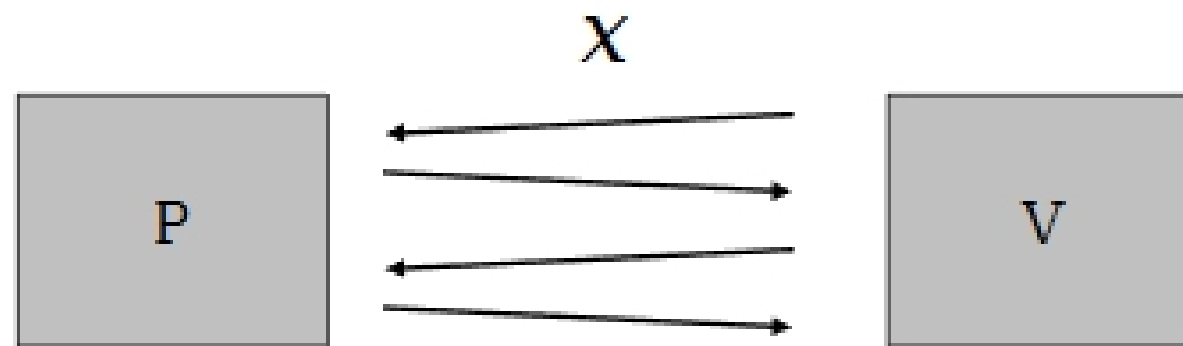
**CPSC 468/568**

# Outline

- IP
- Warmup:  $\text{coNP} \subseteq \text{IP}$  by arithmetization
- PSPACE
- (wrong) attempt at  $\text{PSPACE} \subseteq \text{IP}$
- (revised)  $\text{PSPACE} \subseteq \text{IP}$
- $\text{IP} \subseteq \text{PSPACE}$

# IP

- NP:  $x \in L$  iff  $\exists y$  s.t.  $V(x, y) = 1$ ,  $V$  poly. TM
- IP: 2-player game between  
*prover*  $P$  (computationally unbounded)  
*verifier*  $V$  (probabilistic poly. time)



If  $x \in L, \exists P \Pr[V \text{ accepts}] \geq 2/3$   
(completeness)

If  $x \notin L, \forall P \Pr[V \text{ accepts}] \leq 1/3$  (soundness)