LOGIC	**facts**	**rules**
		$\forall x.(x) \to (x)$
ALGEBRA	**element**	**element**
	$p \in A$	$(p \to q) \in A$
WORLD	**states**	**state transitions**
	x_t	$x_t \overset{f}{\mapsto} x_{t+1}$

(1)
x_t
δx
added
x_t
x_{t+1}
t
matrix representations polynomials
$F(x) = 0\dot{x} = f(x)$

(2)
F
f
f
$(x_t) = x_{t+1} - x_t = \delta x$

(3)
$\{x_i\}$
$F(x_t) = 0(x_t) = \delta x = x_{t+1} - x_t$

(4)
F
f
x_t
logic facts
F
f
logic rules evaluate
$F(x_t)$
$f(x_t)$

Logic formula	**Algebraic form**
$\overset{\wedge}{\to}$	$\vdots$
$\forall x.x$	$h(x)$
	$\forall_x h(x)$
$\forall x.x \to x$	$\forall_x \big(1 + h(x) + h(x) \cdot m(x)\big)$
$\forall x, y, z.x, y \wedge y, z \to x, z$	$\forall_x \forall_y \forall_z \big(1 + f(x,y) \cdot f(y,z) + f(x,y) \cdot f(y,z) \cdot g(x,z)\big)$
	$\mapsto$
general Horn formula	$\forall_{x...} \big(1 + P \cdot Q \cdot R.... + P \cdot Q \cdot R... \cdot Z\big)$
$\forall_{x...} P \wedge Q \wedge R... \to Z$	$\mapsto$

(5)
loss function
$\mathcal{L} = \sum_{\text{eqns}} \epsilon^2 = \sum_i \big(\phi_i(x...) - 1\big)^2.$

(6)
gradient descent
$\nabla_\Phi \mathcal{L} = \frac{\partial \mathcal{L}}{\partial \Phi}$
Φ
deepness shallow learning
grounded ?? ??
$\dot{x_t} \to x_{t+\Delta t}$
interestingness function
x_t
$\text{Intg}(\delta x) = P(\delta x | x_t)$
rete algo-