$$\frac{\underline{\text{base case(s)}} \quad \underline{IH} \longrightarrow \underline{\text{thing proving}}}{\text{what you're proving for}} \; (\_\ \text{arbitrary})$$

$$\frac{P(Lf) \qquad P(t_1) \,\&\, P(t_2) \to P(Br(x, t_1, t_2))}{\forall t \in Trees.\ P(t)} \; (x, t_1, t_2\ \text{arbitrary})$$

RTP $modpre(t, l) = pre(t @ l)$

<u>Base case:</u>

$t = Lf$:

$modpre(Lf, l) = l = [\,] @ l = pre\ Lf\ @\ l$

<u>IH:</u>

$t = t$:

Assume $modpre(t_1, l) = pre\ t_1\ @\ l$

& $modpre(t_2, l) = pre\ t_2\ @\ l$

<u>Inductive Step:</u>

$t = Br(x, t_1, t_2)$

RTP $modpre(Br(x, t_1, t_2), l) = pre(Br(x, t_1, t_2))\ @\ l$

$modpre(Br(x, t_1, t_2), l)$

$= x :: modpre(t_1, modpre(t_2, l))$

$= x :: \text{modpre}(t_1,\ \text{pre}\ t_2\ @\ l)$

$= x :: \text{pre}\ t_1\ @\ (\text{pre}\ t_2\ @\ l)$

property of @ : associativity

$\therefore$

$= x :: (\text{pre}\ t_1\ @\ \text{pre}\ t_2)\ @\ l$

$= (x :: (\text{pre}\ t_1\ @\ \text{pre}\ t_2))\ @\ l$

$= \text{pre}\ Br(x, t_1, t_2)\ @\ l$ $\blacksquare$

$\Diamond$ = possibly

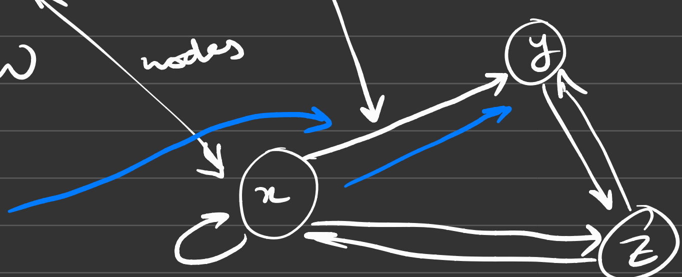
$\Box$ = necessarily

$M = (W, R)$

frame   world   binary relation

$R \subseteq W \times W$

(x, y)



$(x, y) \in R \longleftrightarrow Rxy$ $W = \{x, y, z\}$

$\rho : L \to \{0, 1\}$

$\rho : L \to D$

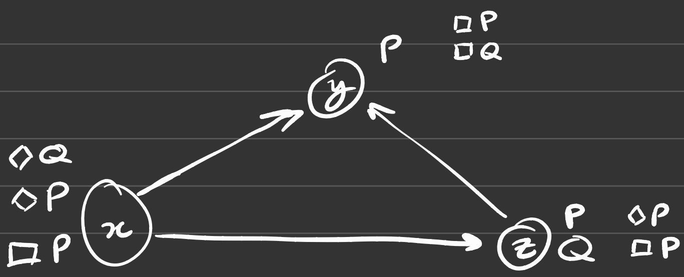
$\underline{\qquad\qquad}$ $L = \text{Vars}$

$\rho : L \to \underline{\text{Pow}(W)}$

$\uparrow$

P, Q

$\{x, y, z\} = \{\emptyset, \{x\}, \{y\}, \{z\}, \{x, y\}, \{x, z\} \ldots\}$



$M = (\{x, y, z\}, \{(x, y), (x, z), (z, y)\})$

$\rho(P) =$ all the worlds in which P is True
$= \{y, z\}$

$\rho(Q) = \{z\}$

$M, w \models_\rho \Diamond A \iff \exists w' \in W.\ Rww' \ \&\ M, w' \models_\rho A$

$M, w \models_\rho \Box A \iff \forall w' \in W.\ Rww' \to M, w' \models_\rho A$

$\Box A \equiv \neg \Diamond \neg A$

$\Diamond A \equiv \neg \Box \neg A$

Reflexive = always has loop to self

Transitive

Symmetric