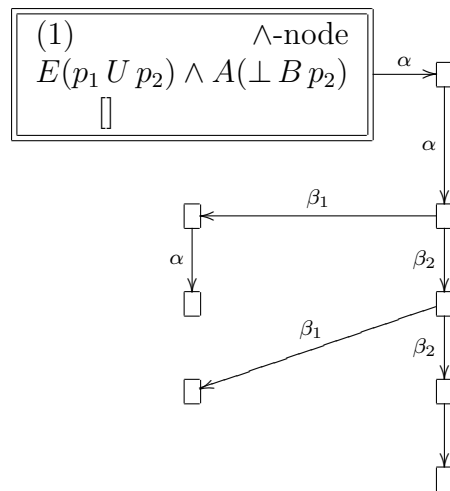


Table 1: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

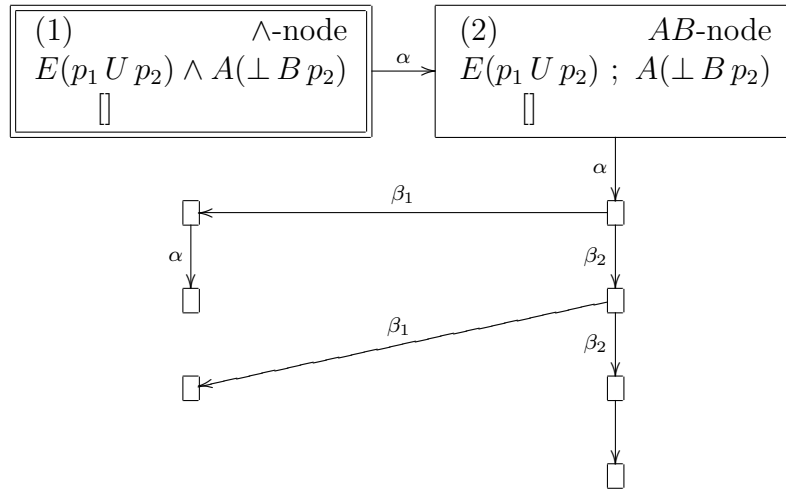
Node 1  $\downarrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 2 ↓



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 3 ↓

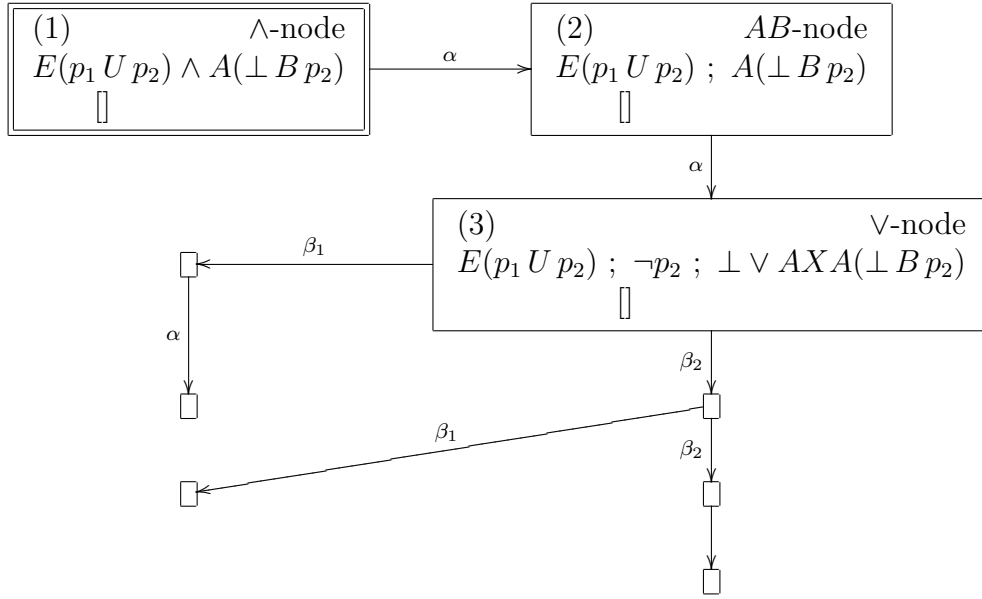


Table 2: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 3a  $\downarrow$

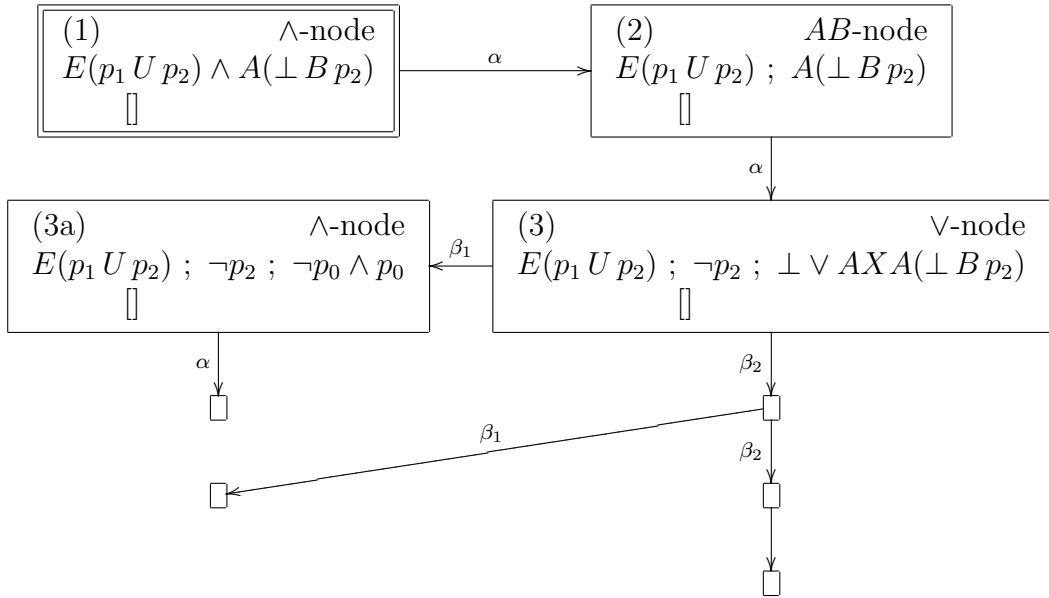


Table 3: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 3a' $\downarrow$

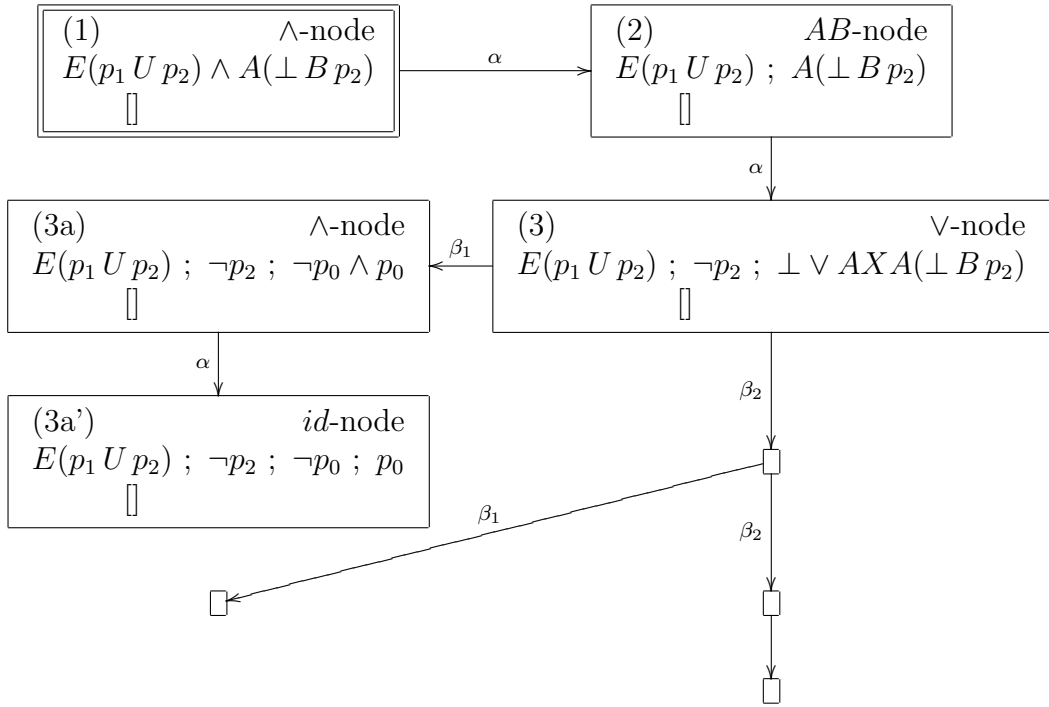


Table 4: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 3a'↑

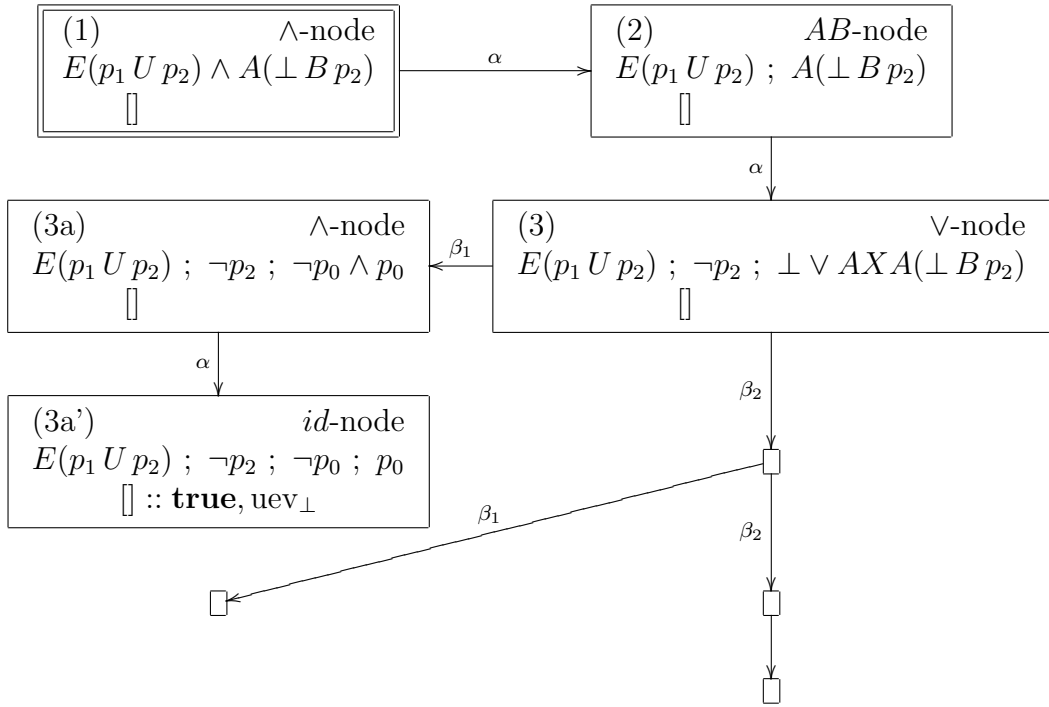


Table 5: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 3a  $\uparrow$

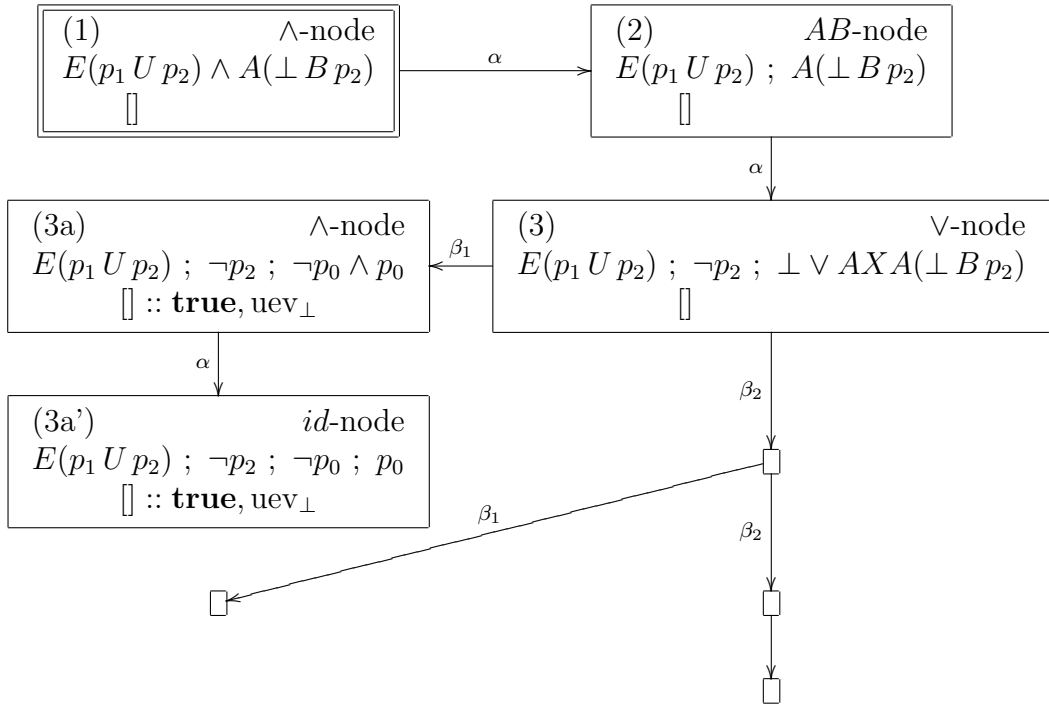


Table 6: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 3b  $\downarrow$

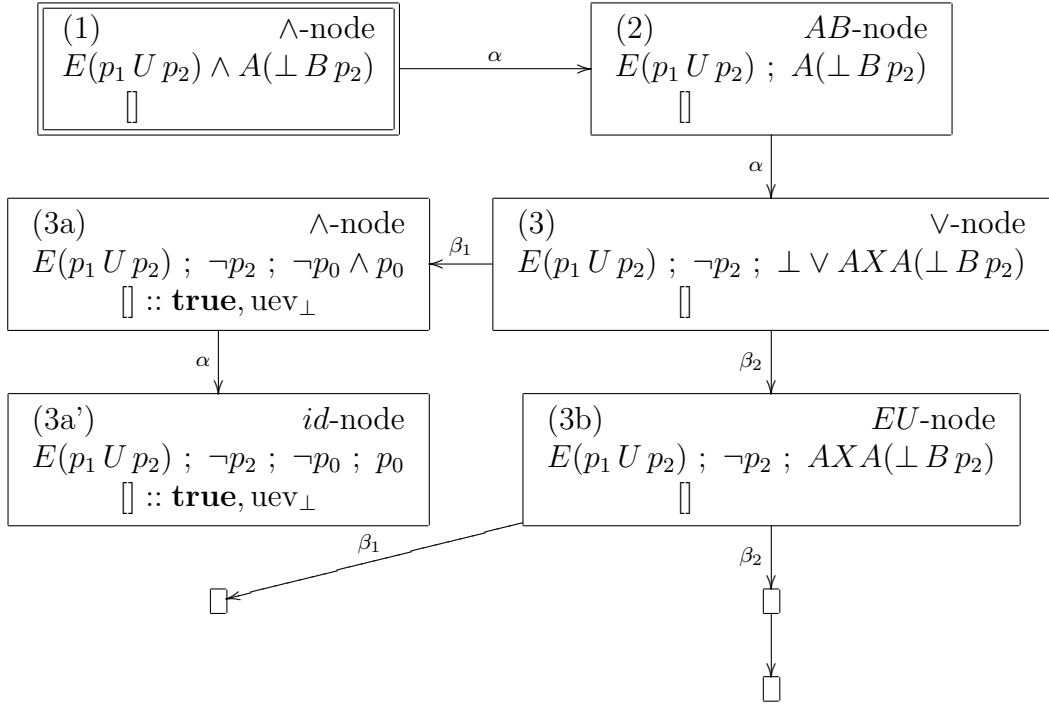




Table 7: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 4a  $\downarrow$

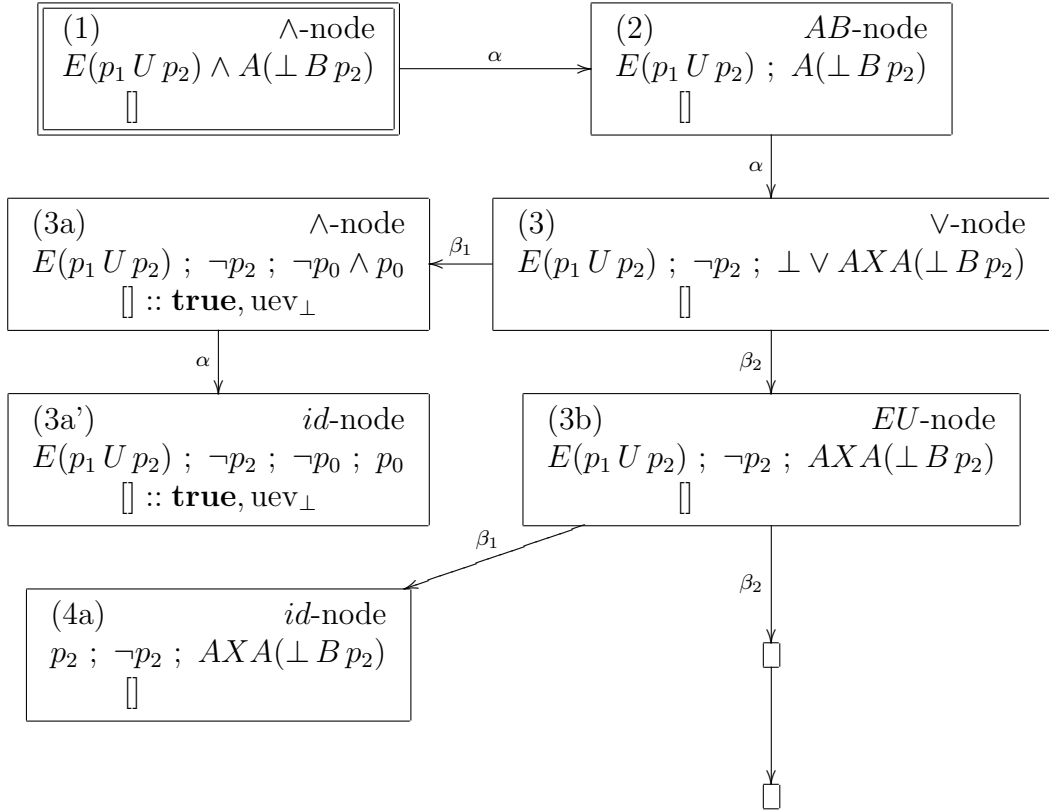


Table 8: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 4a  $\uparrow$

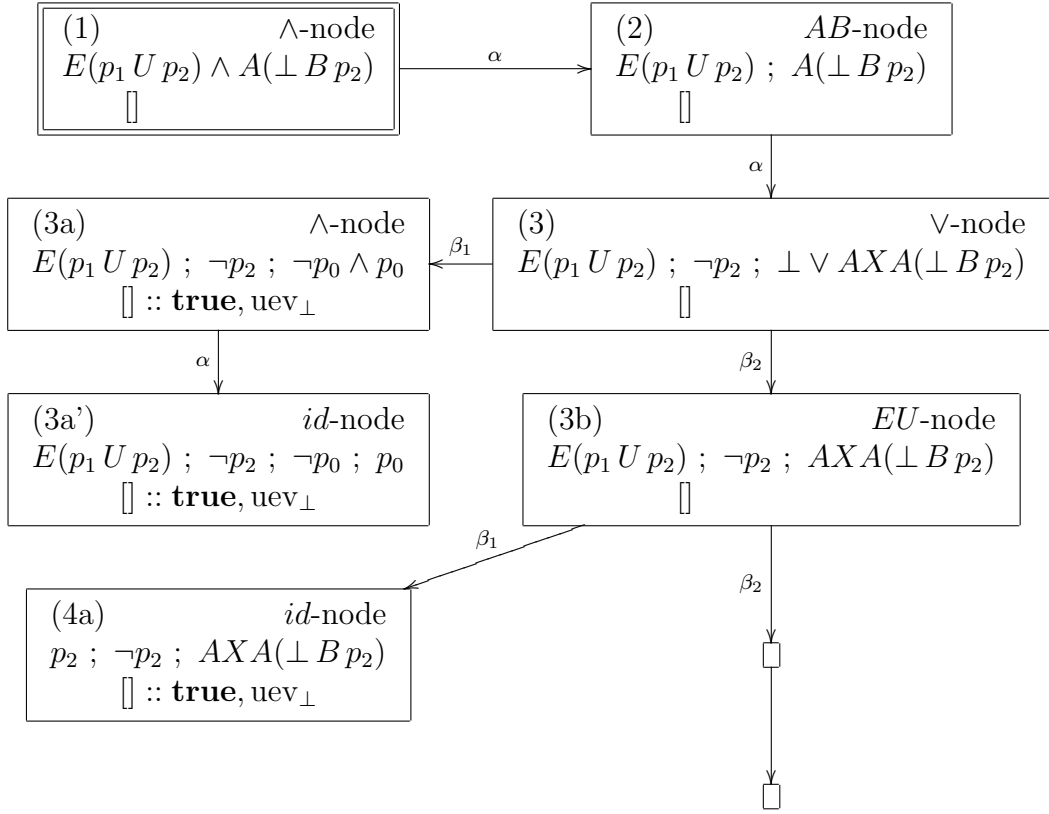


Table 9: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 4b  $\downarrow$

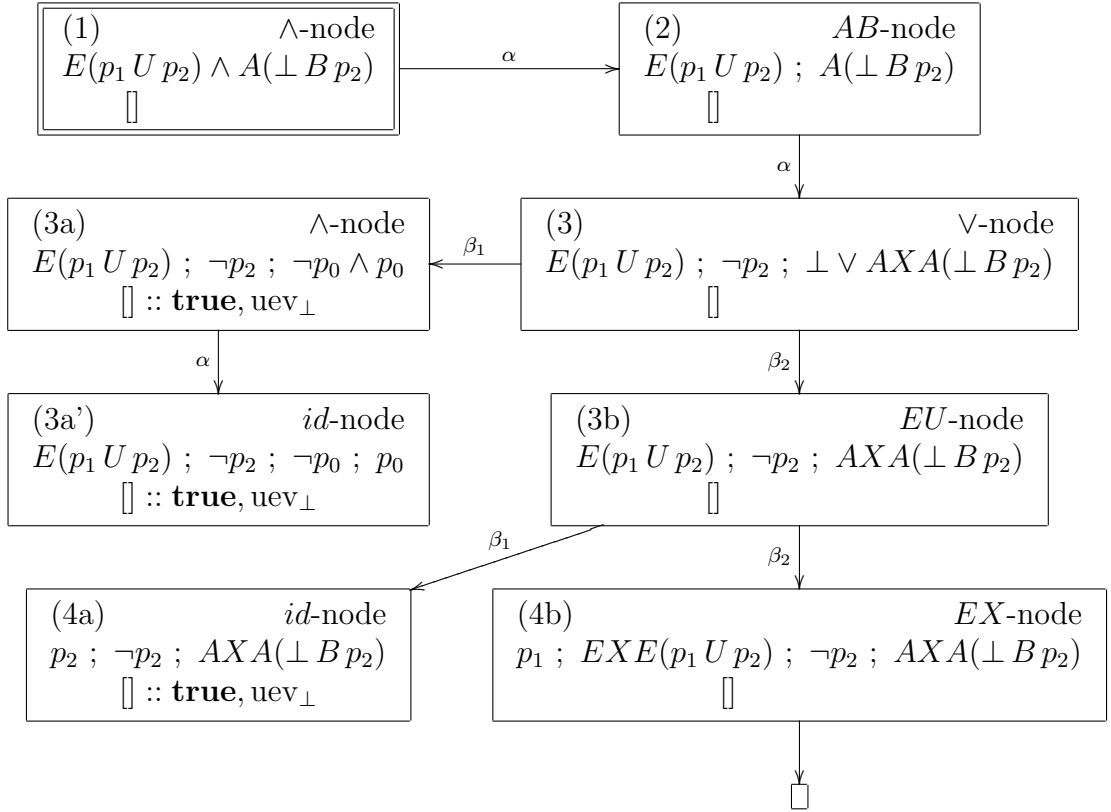
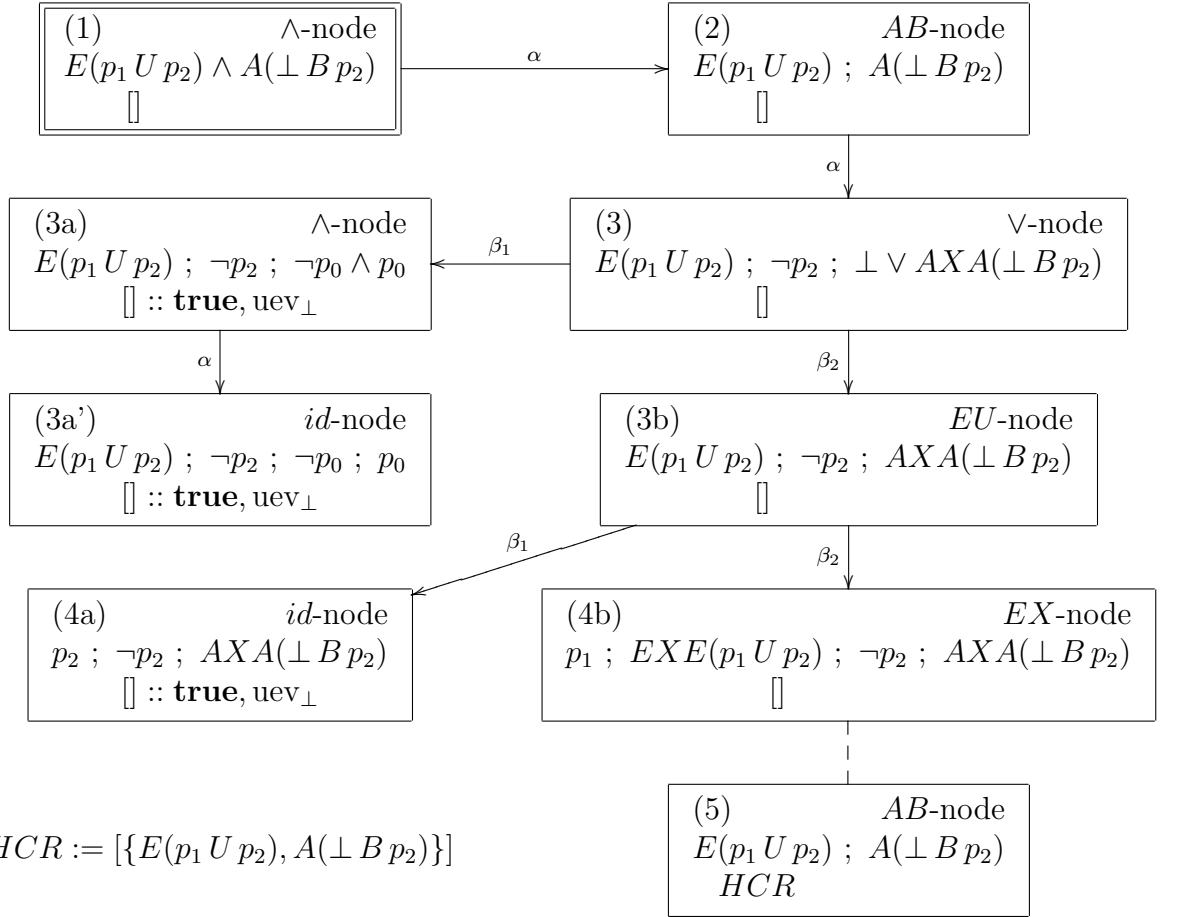


Table 10: Smullyan's  $\alpha$ - and  $\beta$ -notation to classify formulae

$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

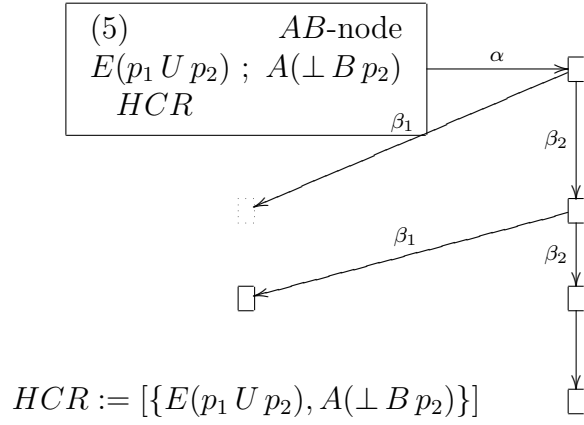
Node 5  $\downarrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

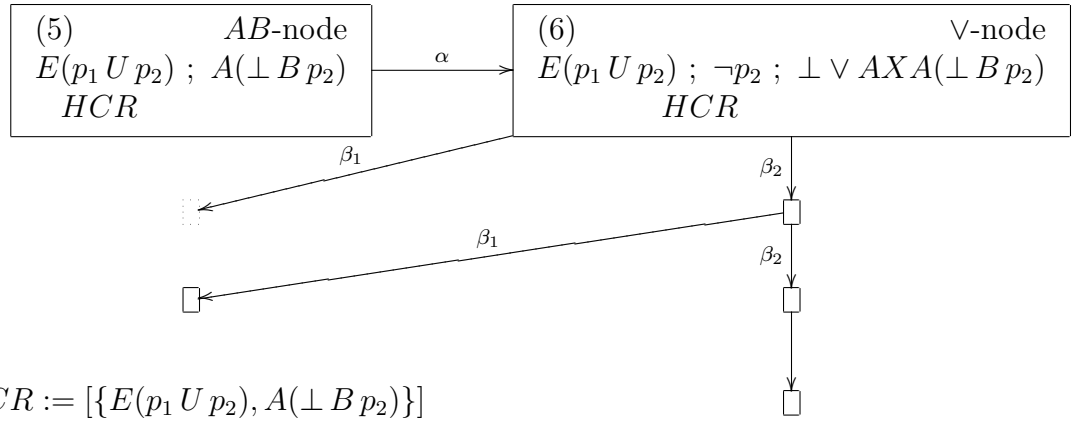
Node 5 ↓



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

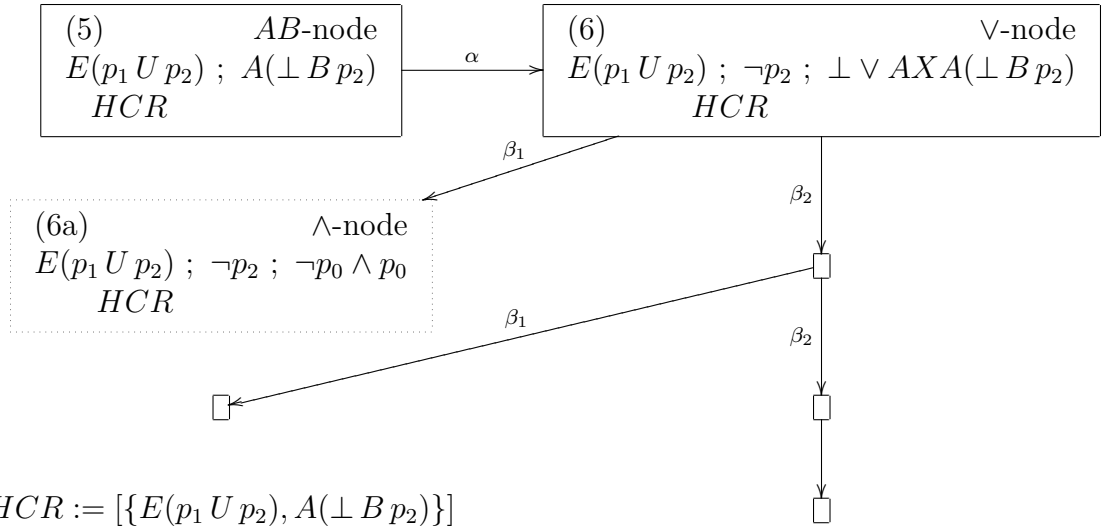
Node 6  $\downarrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

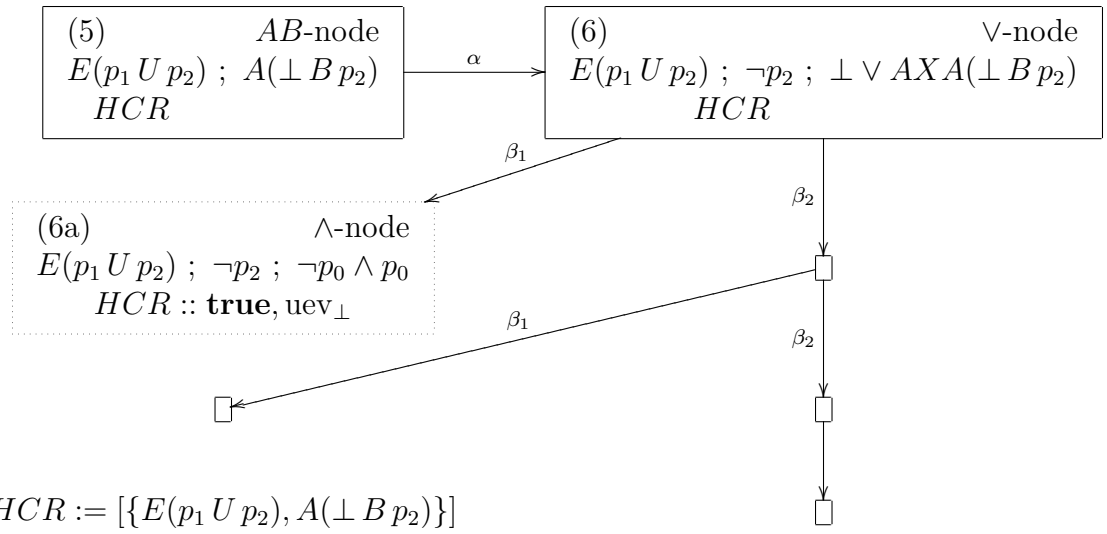
Node 6a ↓



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 6a  $\uparrow$

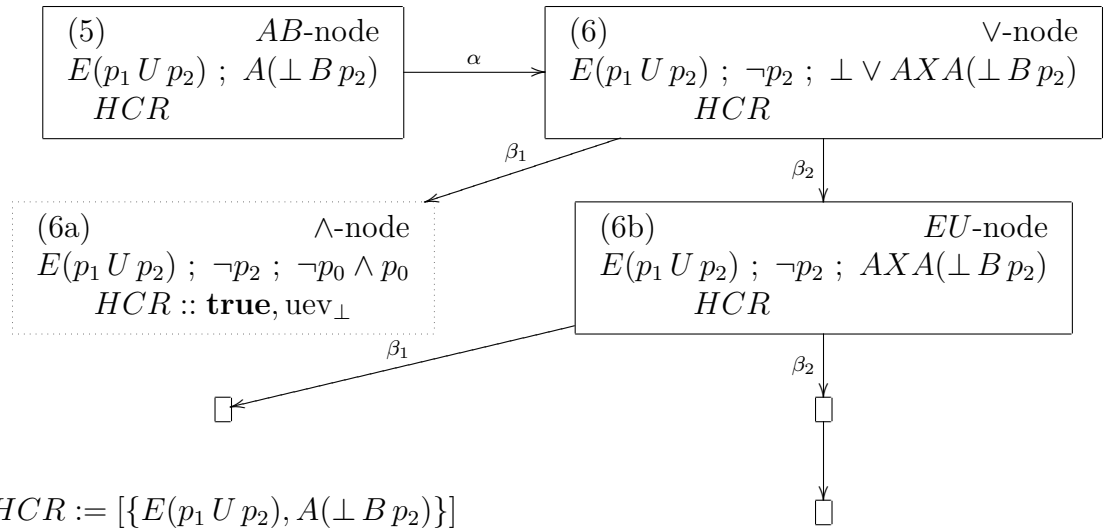




$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

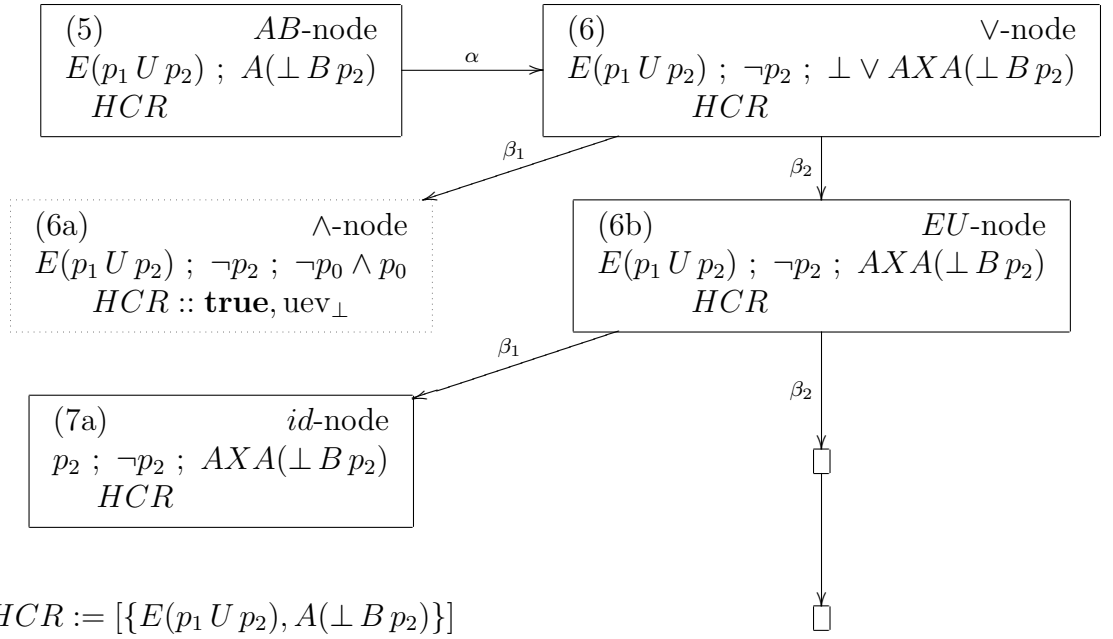
Node 6b  $\downarrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

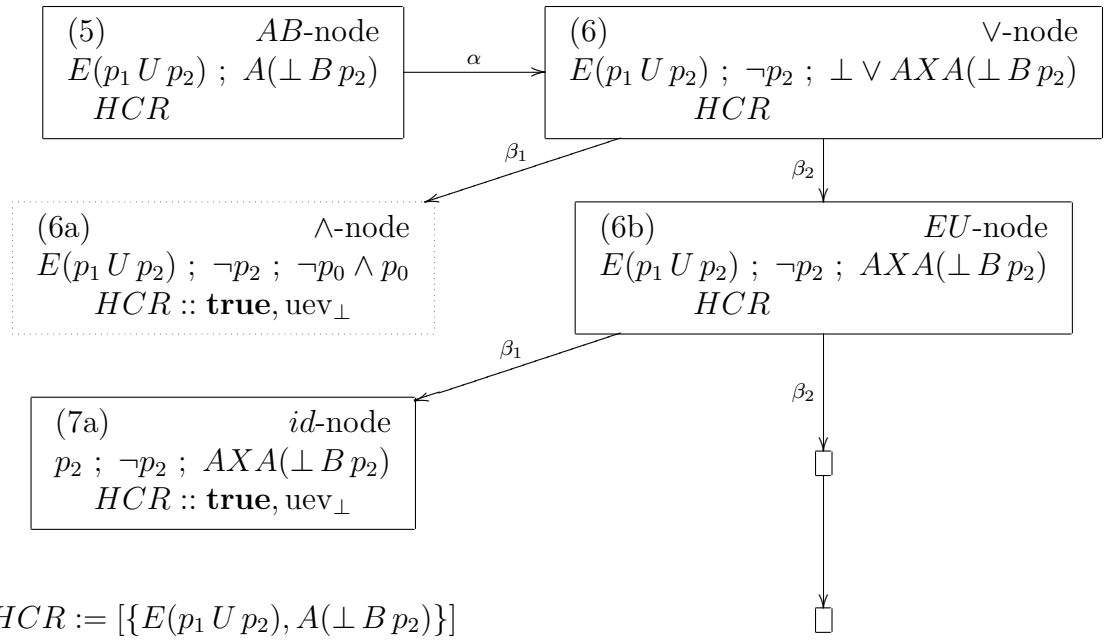
Node 7a ↓



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

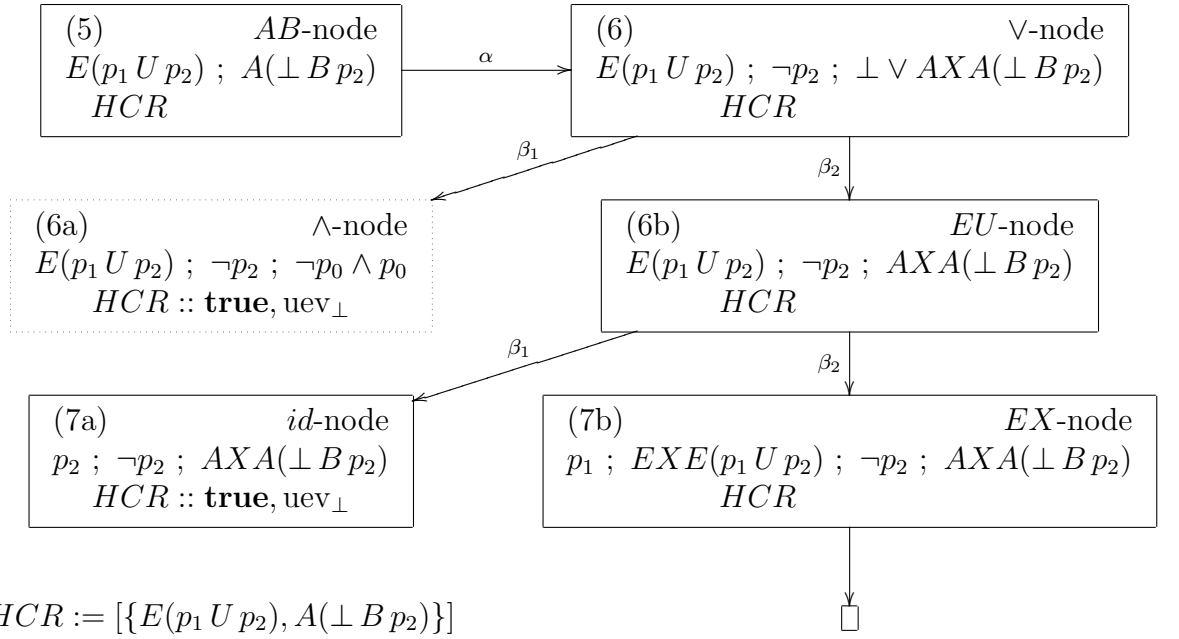
Node 7a  $\uparrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

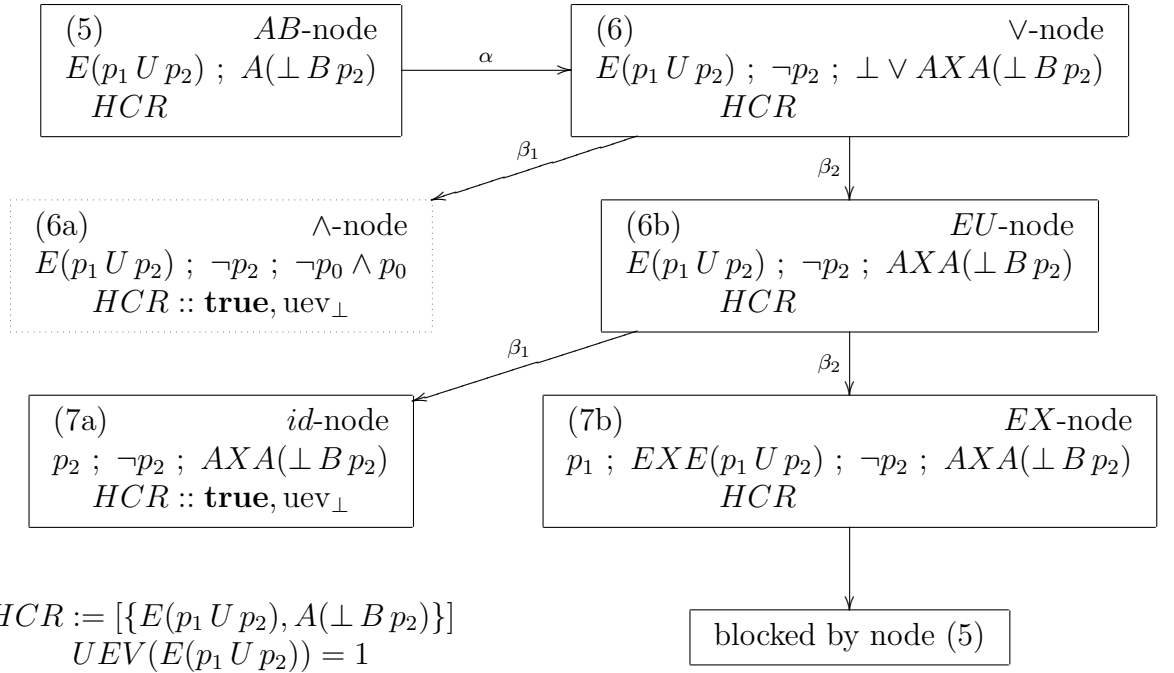
Node 7b  $\downarrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

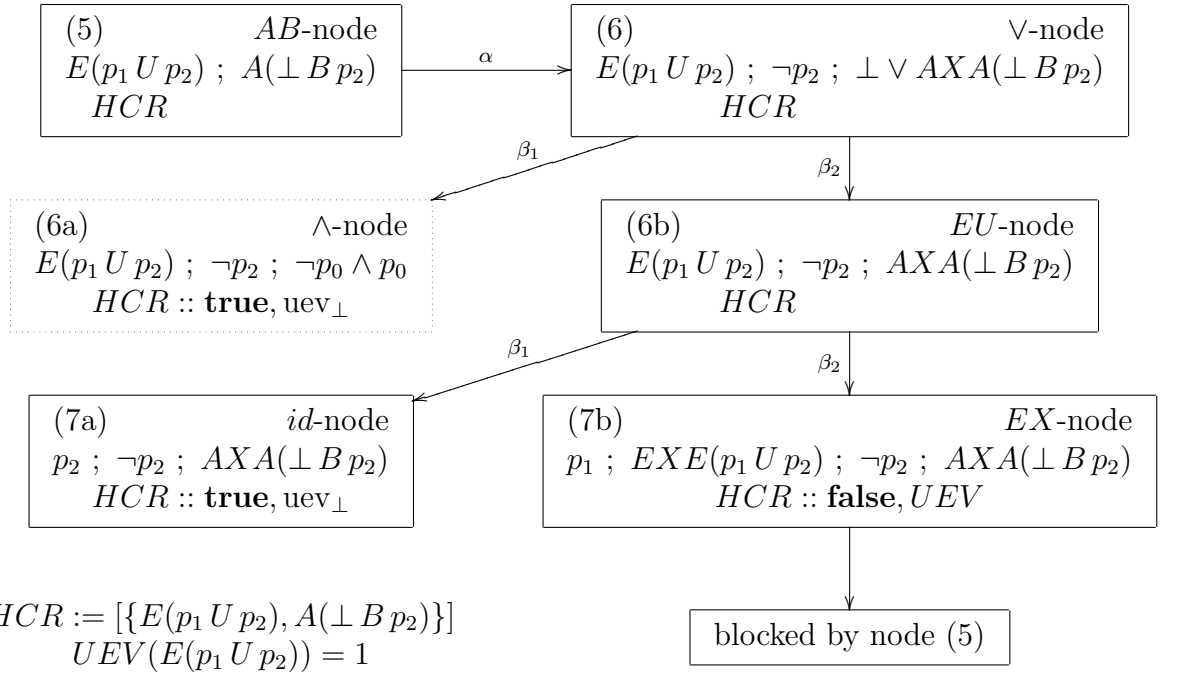
Node 8 ↓



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

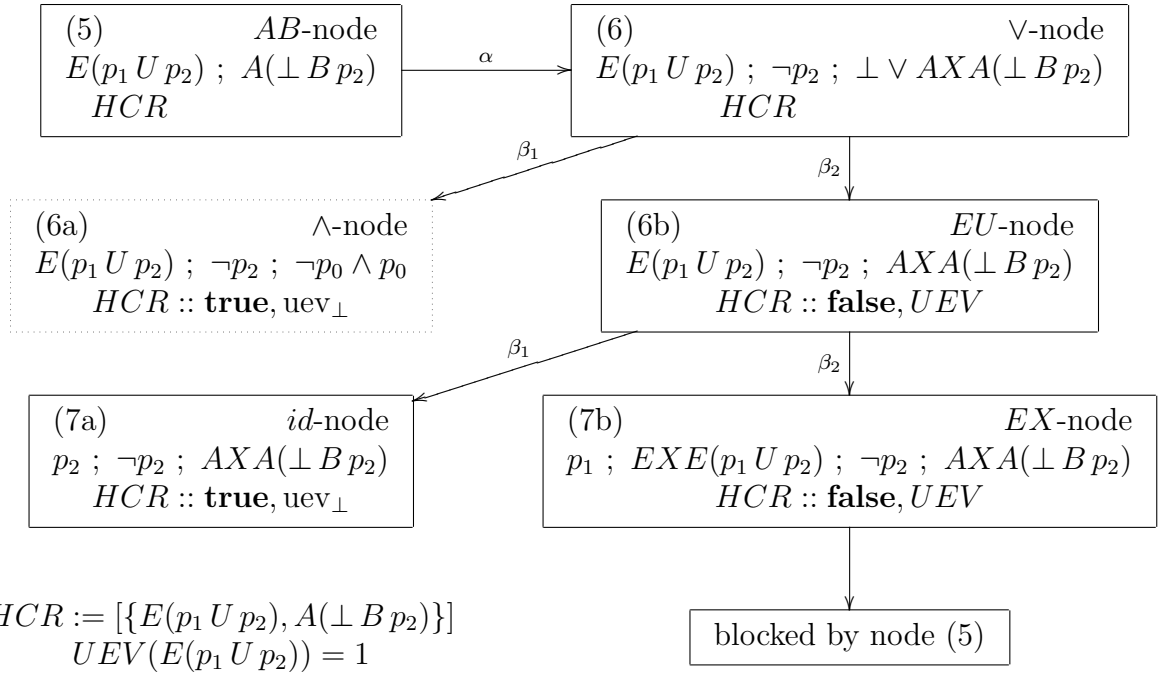
Node 7b  $\uparrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

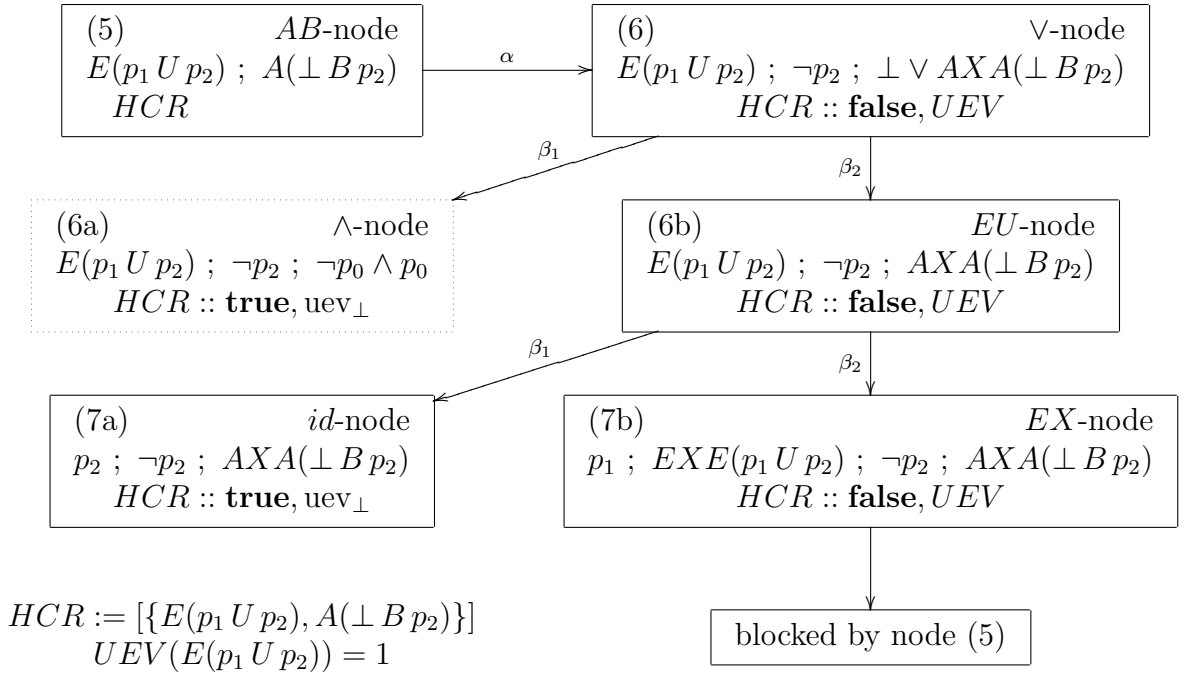
Node 6b  $\uparrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 6  $\uparrow$

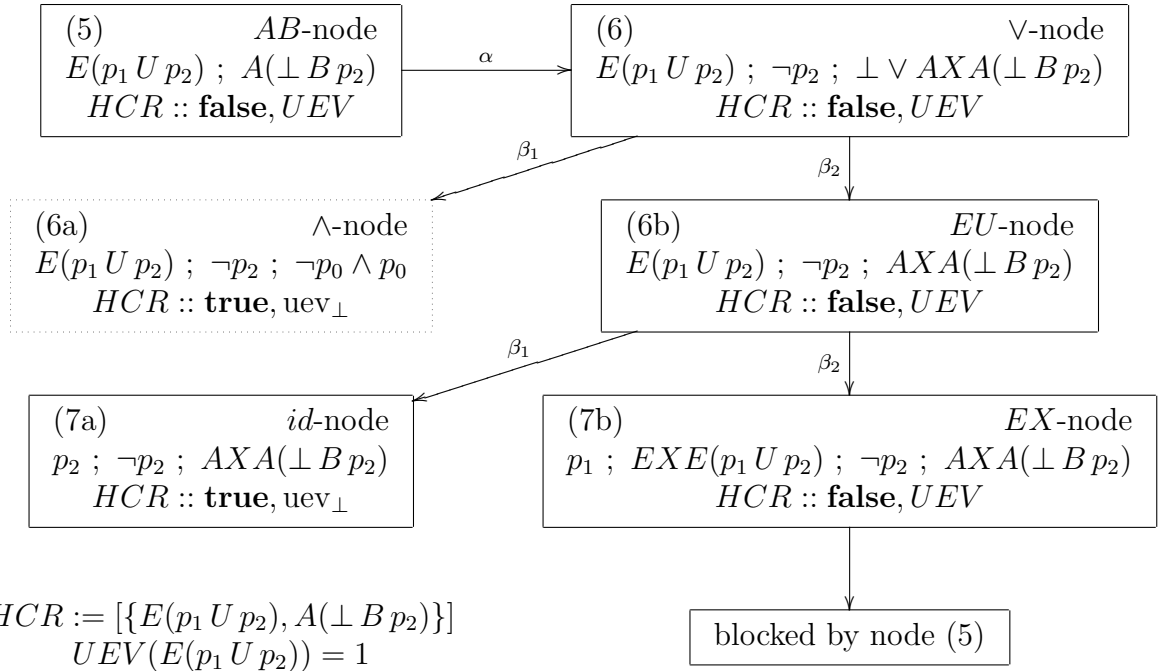




$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

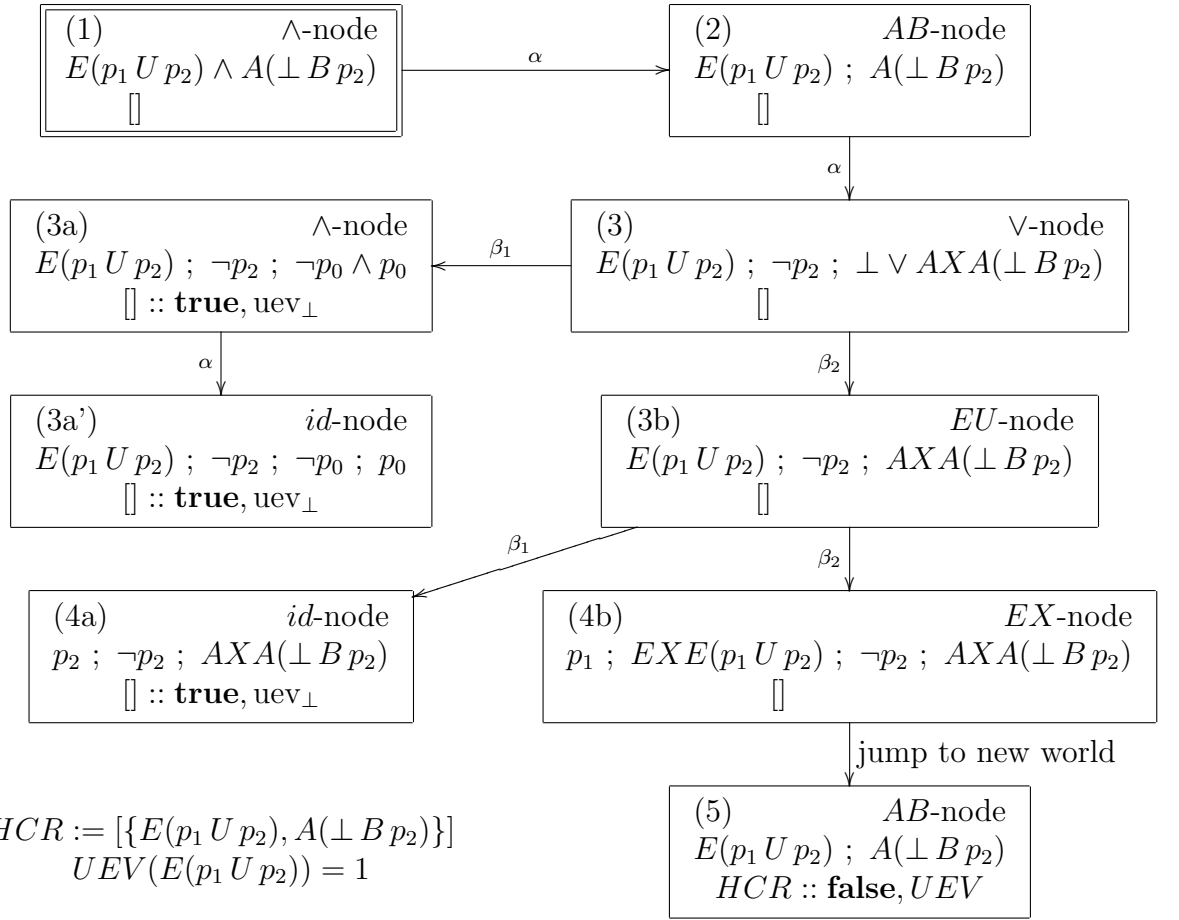
Node 5  $\uparrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

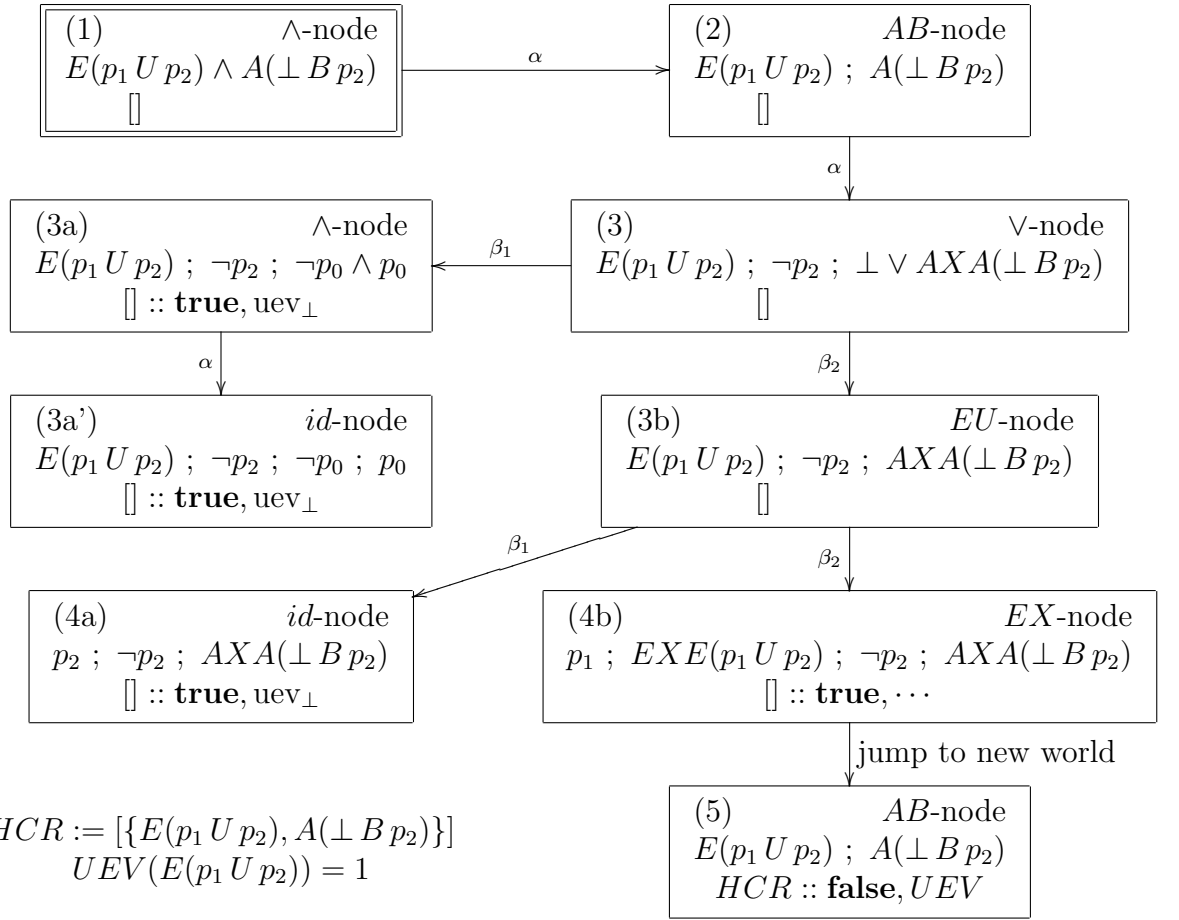
Node 5  $\uparrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 4b  $\uparrow$



$\alpha$	$\alpha_1$	$\alpha_2$
$\varphi \wedge \psi$	$\varphi$	$\psi$
$E(\varphi B \psi)$	$\sim \psi$	$\varphi \vee EXE(\varphi B \psi)$
$A(\varphi B \psi)$	$\sim \psi$	$\varphi \vee AXA(\varphi B \psi)$

$\beta$	$\beta_1$	$\beta_2$
$\varphi \vee \psi$	$\varphi$	$\psi$
$E(\varphi U \psi)$	$\psi$	$\varphi \wedge EXE(\varphi U \psi)$
$A(\varphi U \psi)$	$\psi$	$\varphi \wedge AXA(\varphi U \psi)$

Node 4b - 1  $\uparrow$

