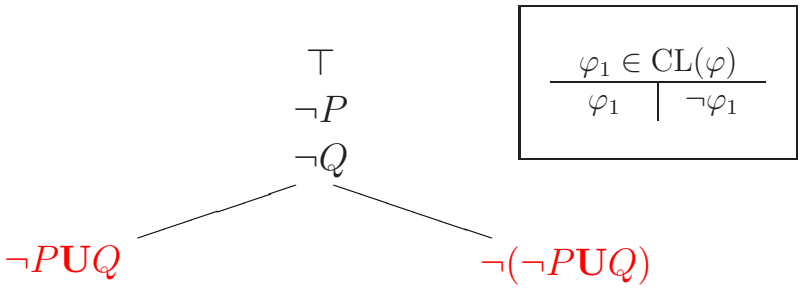
$$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$$

$$\begin{array}{c} \top \\ \neg P \\ \neg Q \end{array}$$

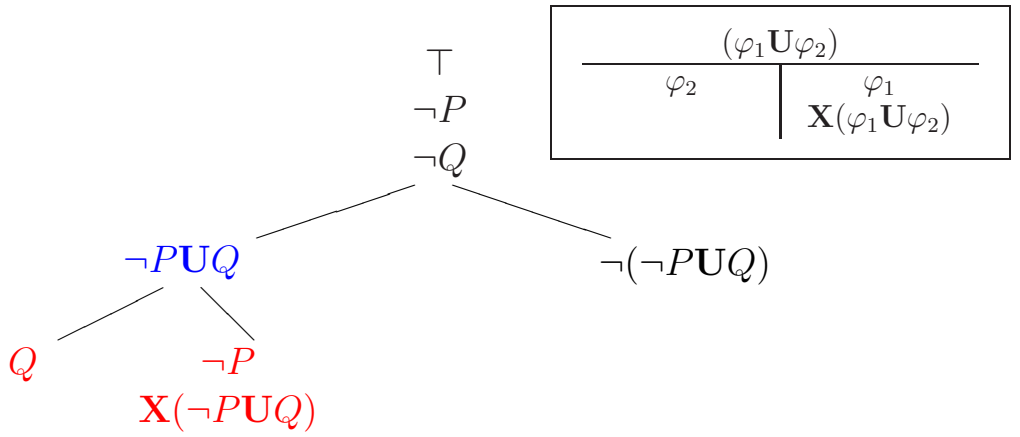
Atomit:

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$



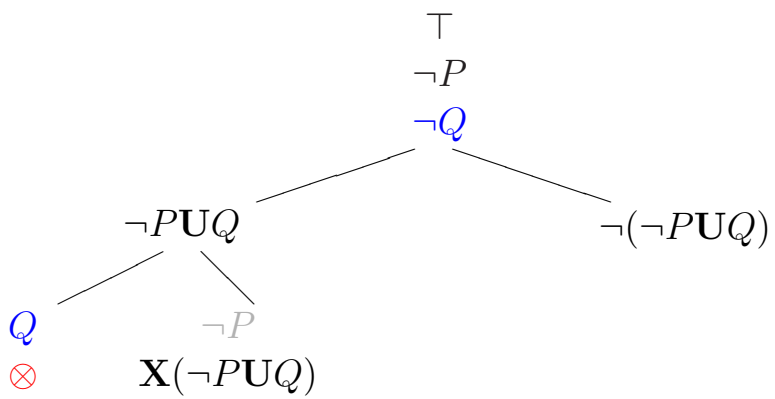
Atomit:

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$



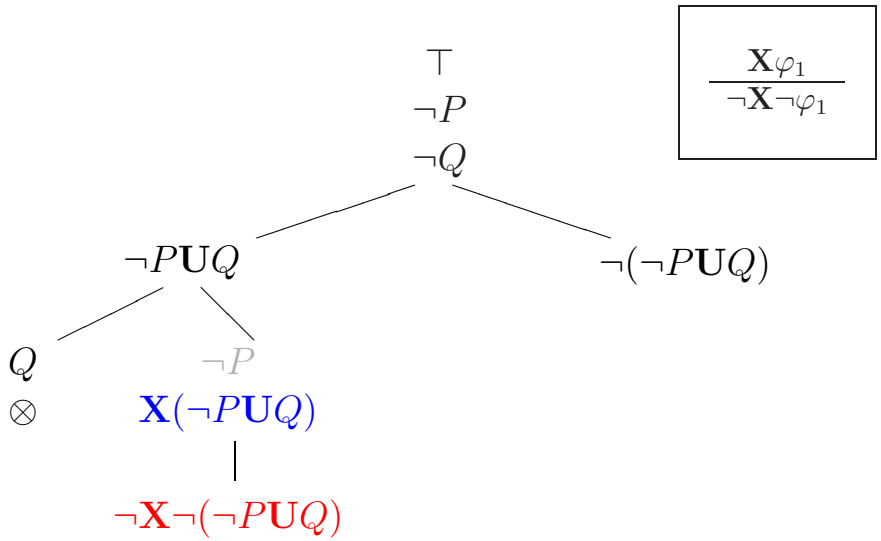
Atomit:

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$



Atomit:

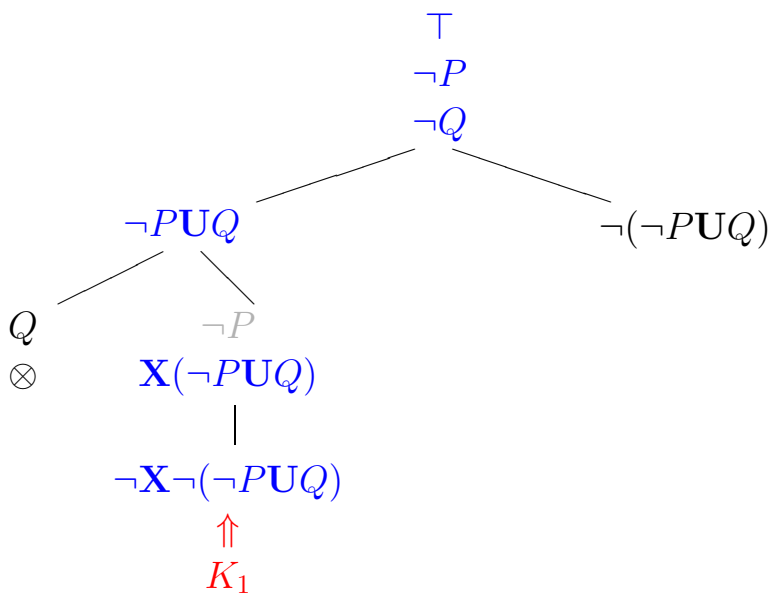
$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$



$$\frac{\mathbf{X}\varphi_1}{\neg \mathbf{X} \neg \varphi_1}$$

Atomit:

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$

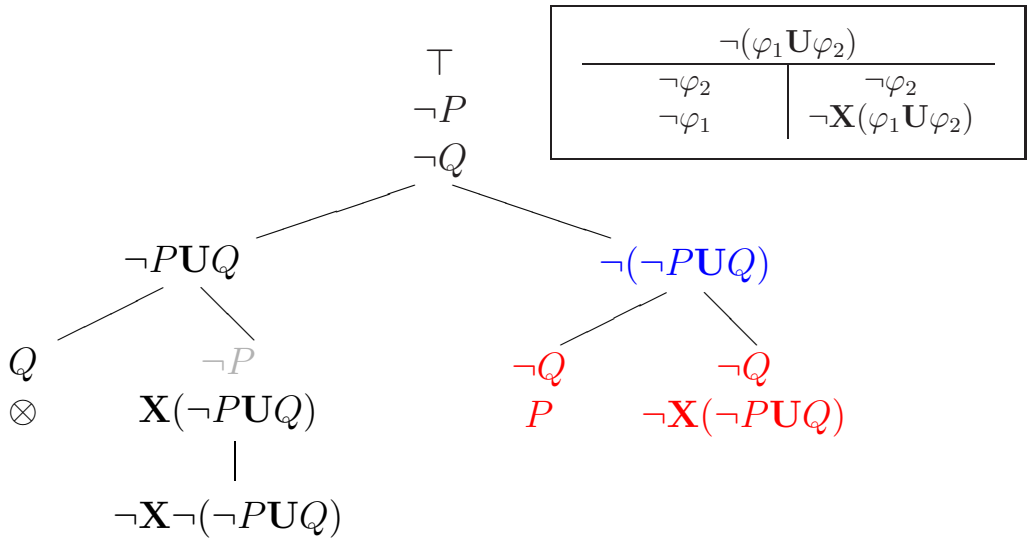


Atomit:

(a, K_1)
(c, K_1)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$



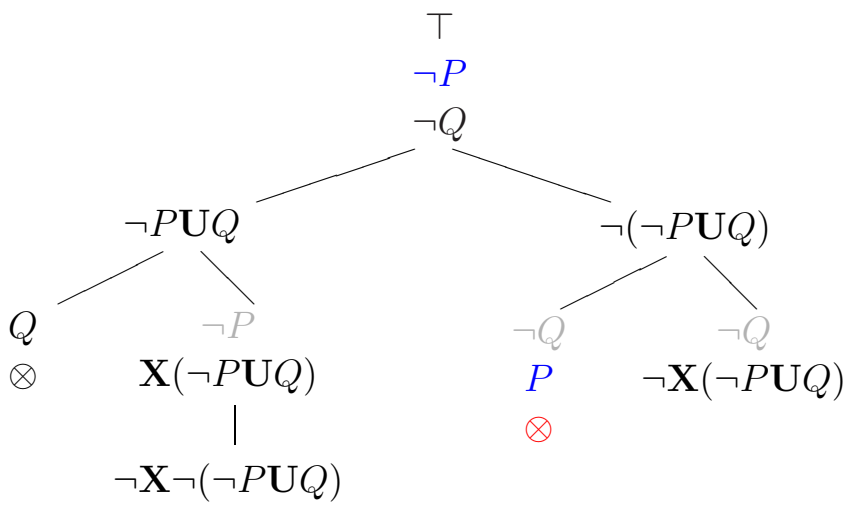
$\neg(\varphi_1 \mathbf{U} \varphi_2)$	
$\neg\varphi_2$ $\neg\varphi_1$	$\neg\varphi_2$ $\neg\mathbf{X}(\varphi_1 \mathbf{U} \varphi_2)$

Atomit:

(a, K_1)
(c, K_1)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$

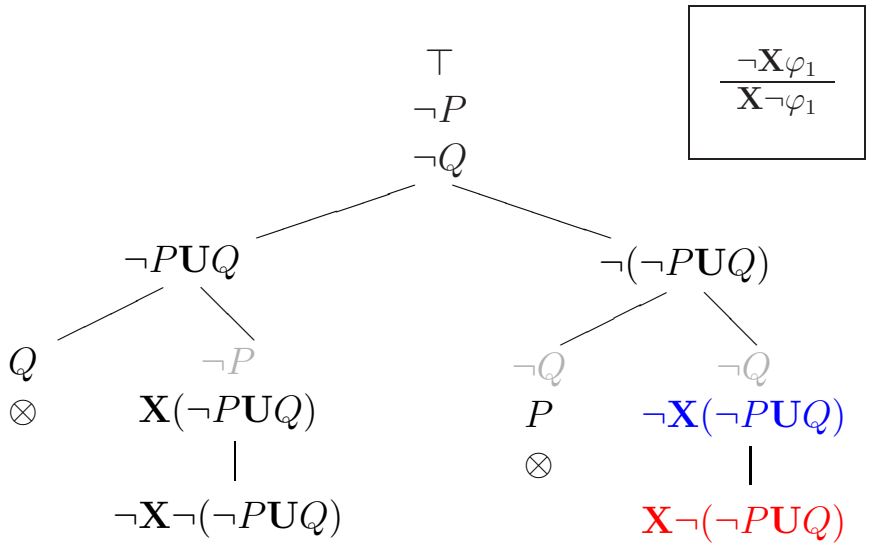


Atomit:

(a, K_1)
(c, K_1)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$

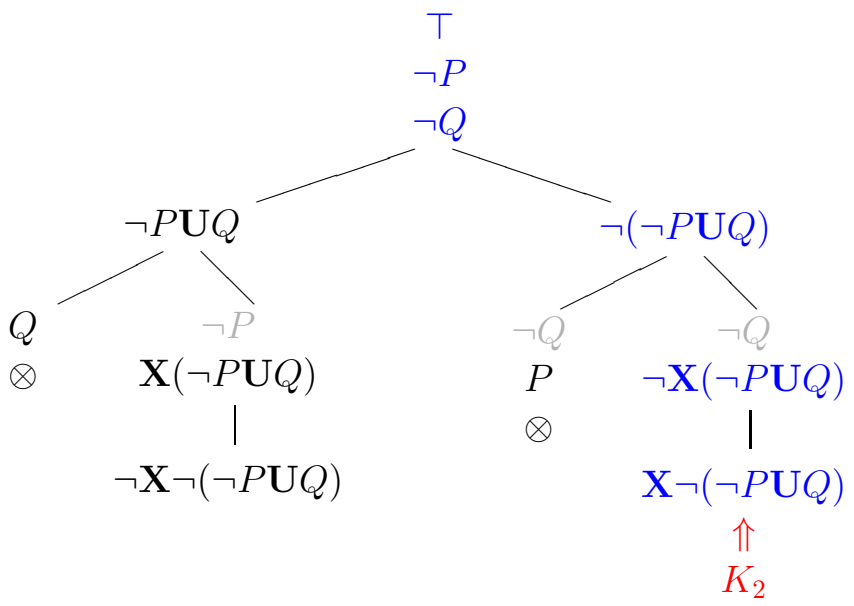


Atomit:

(a, K_1)
(c, K_1)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(a, P) = v(a, Q) = v(c, P) = v(c, Q) = \text{false}$



Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$
$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$

$v(b, P) = v(b, Q) = \text{true}$

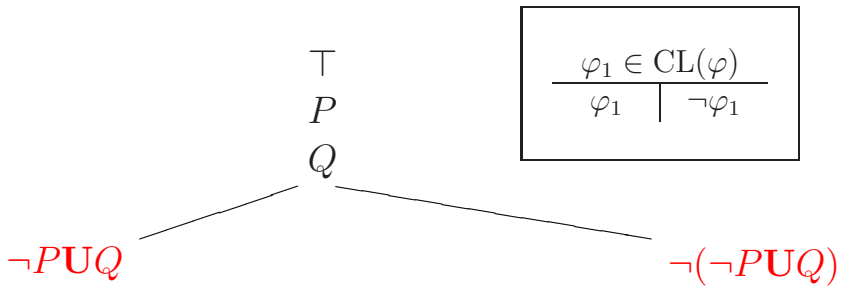
$\top$
P
Q

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$K_1 = \{\top, \neg P, \neg Q, \neg P \mathbf{U} Q, \mathbf{X}(\neg P \mathbf{U} Q), \neg \mathbf{X} \neg (\neg P \mathbf{U} Q)\}$
$K_2 = \{\top, \neg P, \neg Q, \neg (\neg P \mathbf{U} Q), \neg \mathbf{X}(\neg P \mathbf{U} Q), \mathbf{X} \neg (\neg P \mathbf{U} Q)\}$

$v(b, P) = v(b, Q) = \text{true}$

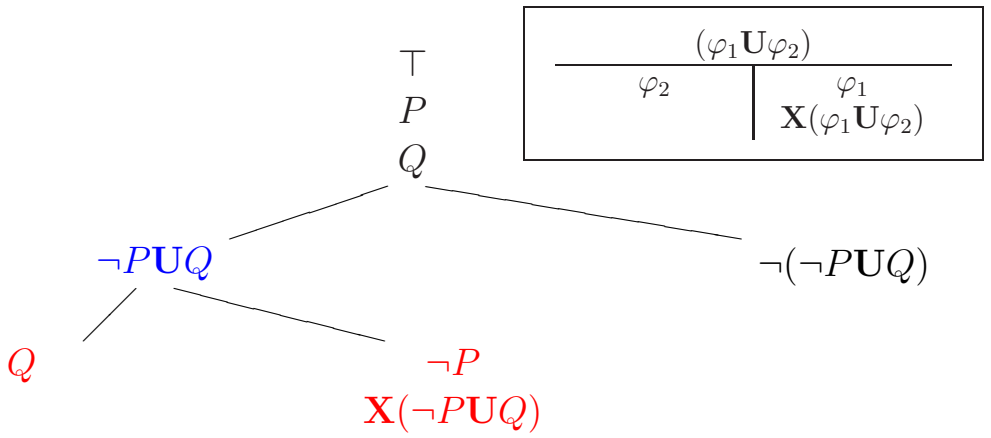


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$

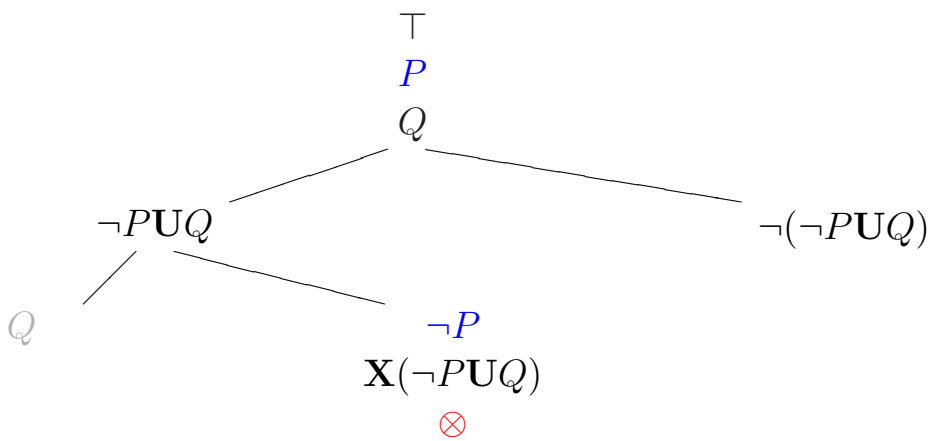


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$

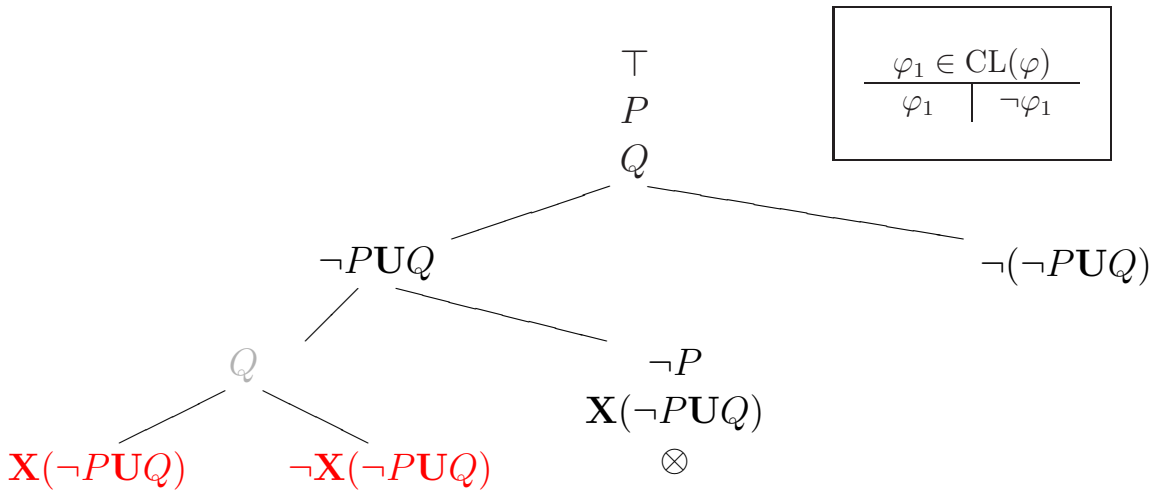


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$



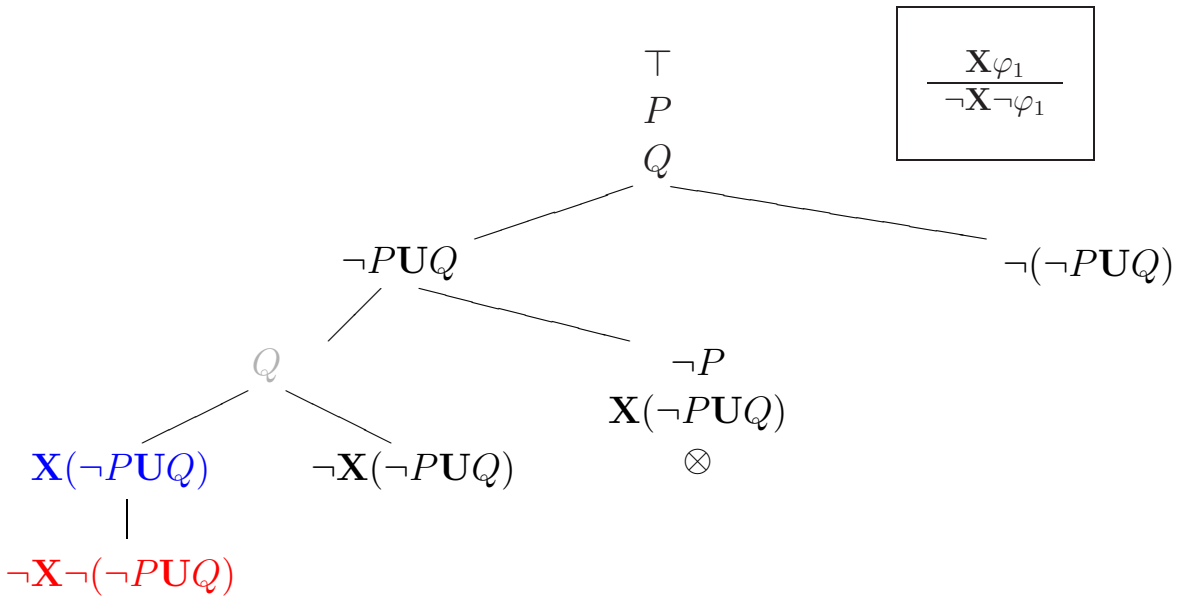
$$\frac{\varphi_1 \in \mathrm{CL}(\varphi)}{\varphi_1 \mid \neg\varphi_1}$$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$



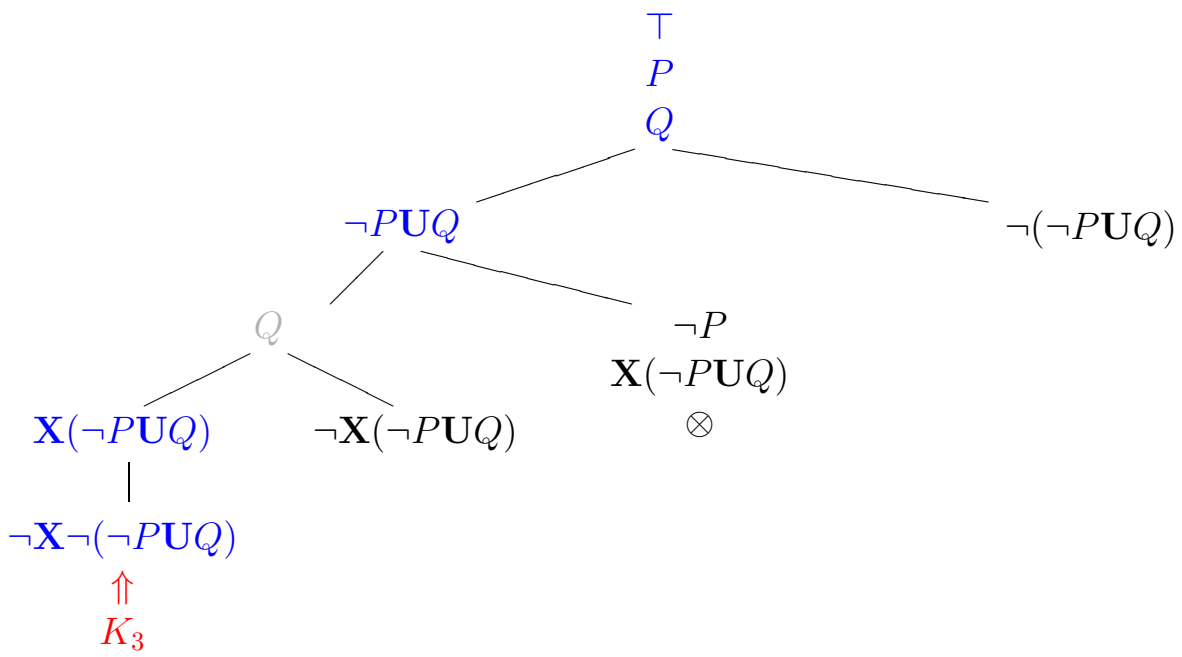
$$\frac{\mathbf{X}\varphi_1}{\neg\mathbf{X}\neg\varphi_1}$$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$

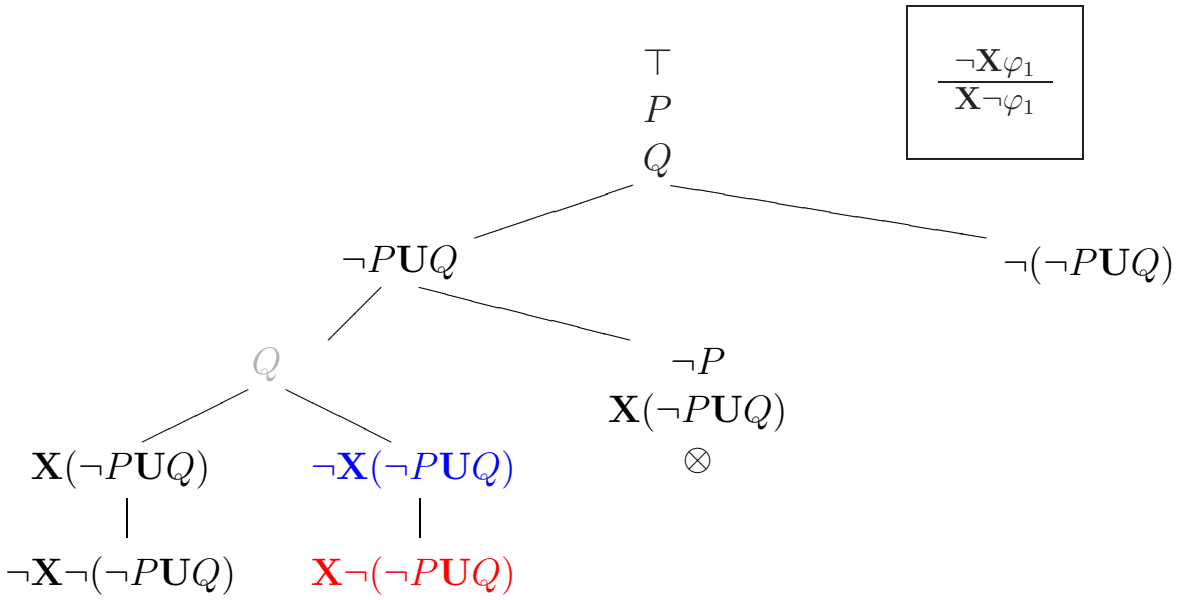


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$



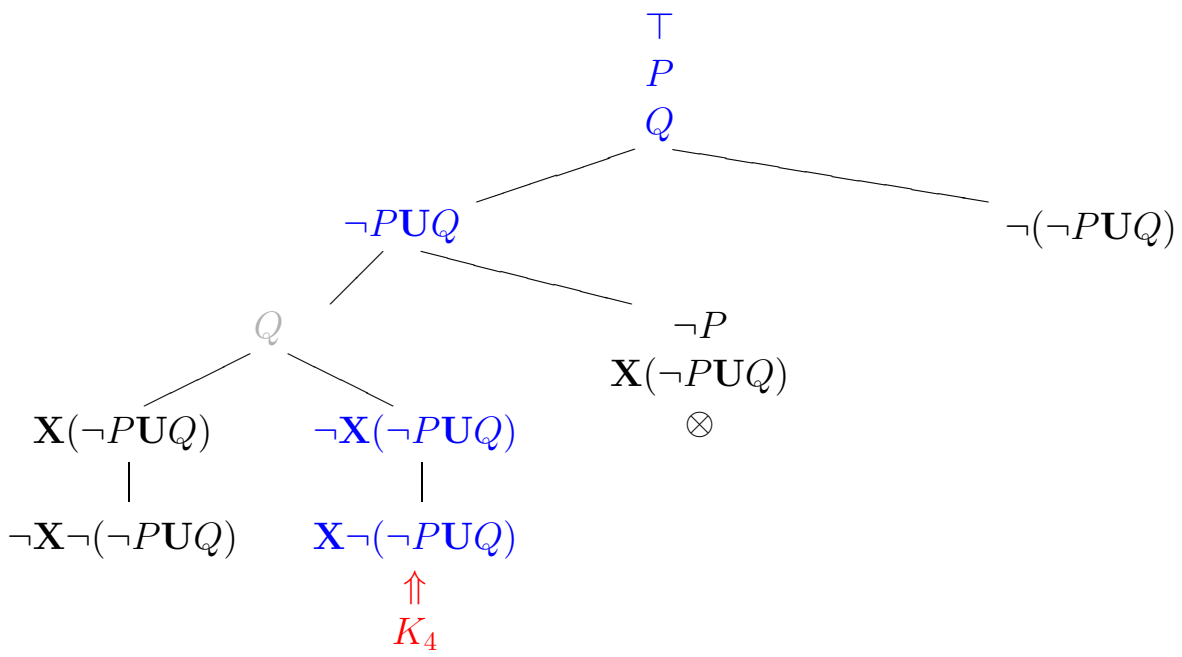
$$\frac{\neg\mathbf{X}\varphi_1}{\mathbf{X}\neg\varphi_1}$$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$

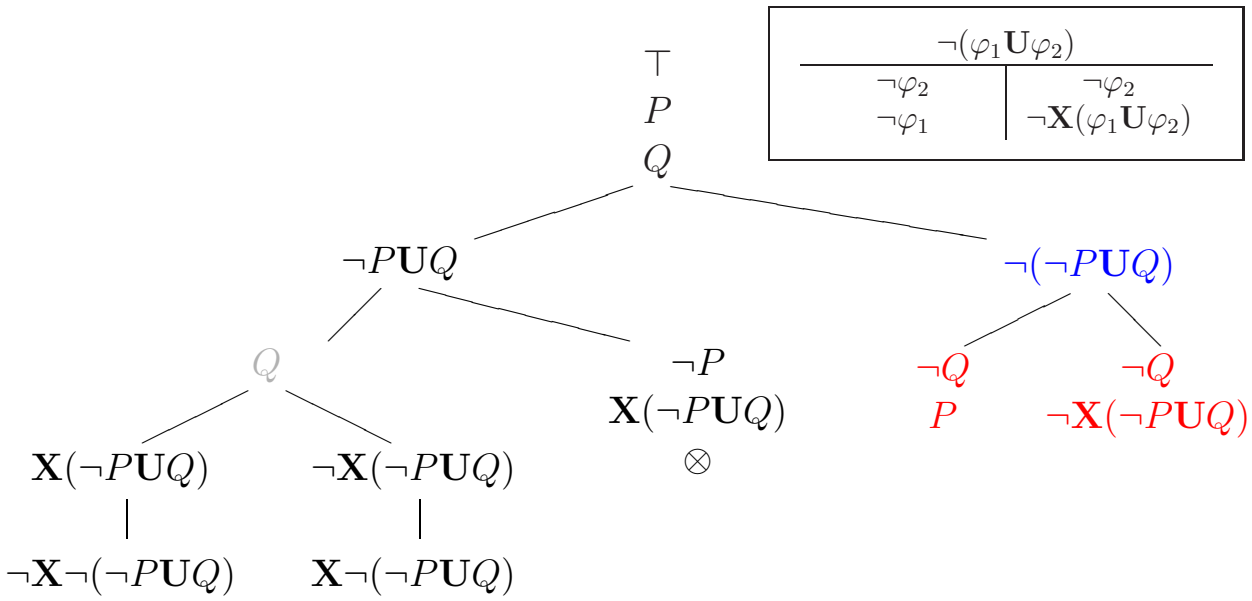


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$



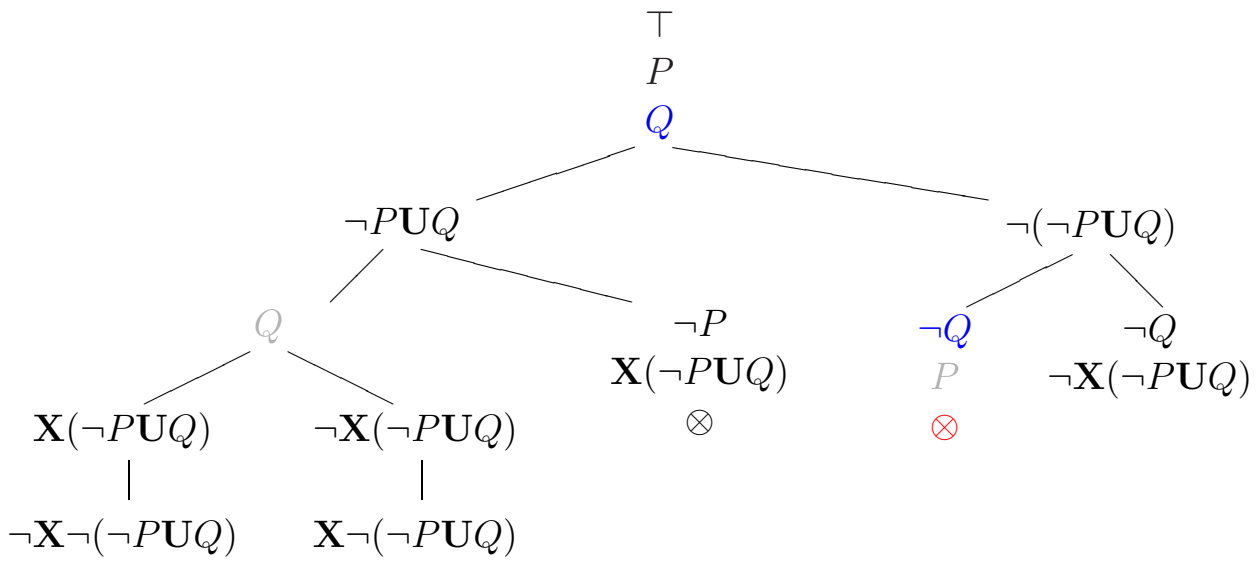
$\neg(\varphi_1 \mathbf{U} \varphi_2)$	
$\neg\varphi_2$ $\neg\varphi_1$	$\neg\varphi_2$ $\neg\mathbf{X}(\varphi_1 \mathbf{U} \varphi_2)$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$

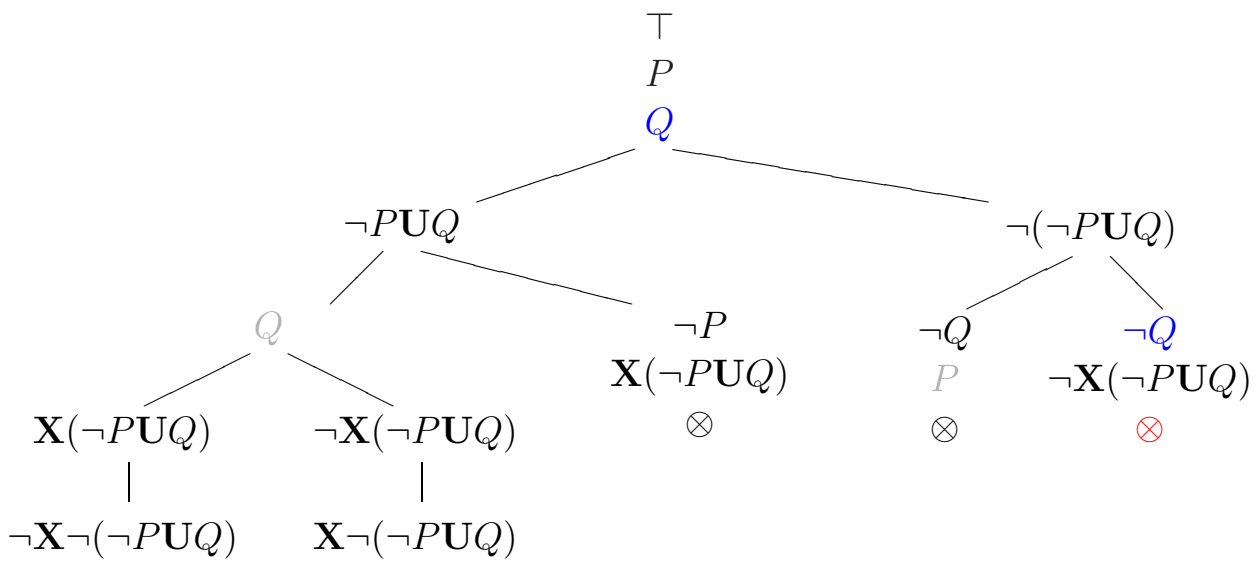


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(b, P) = v(b, Q) = \text{true}$



Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

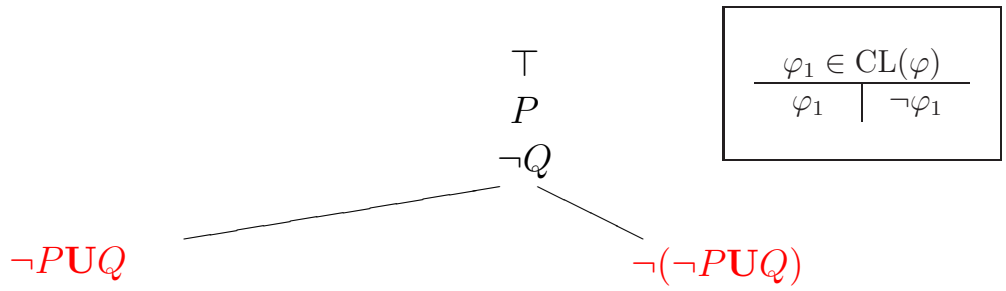
$$\top$$
$$P$$
$$\neg Q$$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P \mathbf{U} Q, \mathbf{X}(\neg P \mathbf{U} Q), \neg \mathbf{X} \neg (\neg P \mathbf{U} Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P \mathbf{U} Q), \neg \mathbf{X}(\neg P \mathbf{U} Q), \mathbf{X} \neg (\neg P \mathbf{U} Q)\}$$
$$K_3 = \{\top, P, Q, \neg P \mathbf{U} Q, \mathbf{X}(\neg P \mathbf{U} Q), \neg \mathbf{X} \neg (\neg P \mathbf{U} Q)\}$$
$$K_4 = \{\top, P, Q, \neg P \mathbf{U} Q, \neg \mathbf{X}(\neg P \mathbf{U} Q), \mathbf{X} \neg (\neg P \mathbf{U} Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$



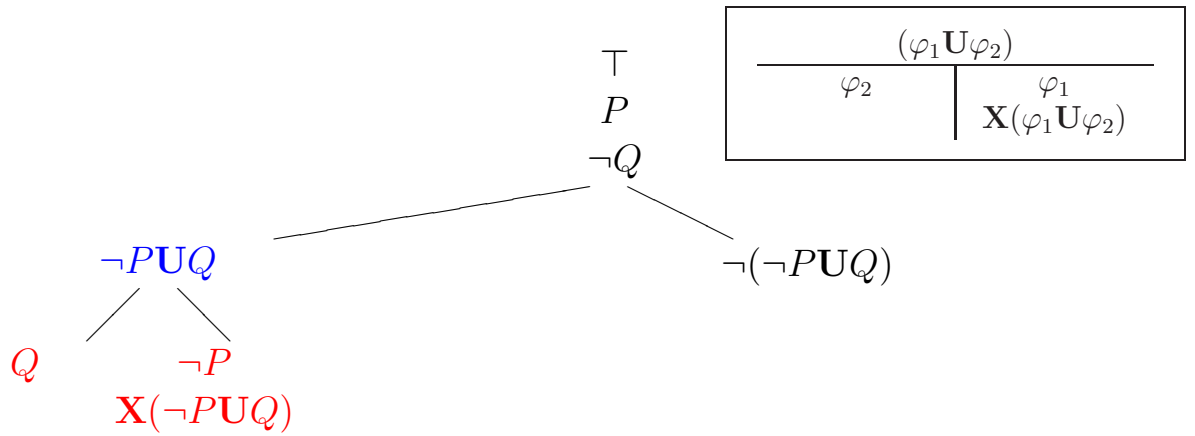
$$\frac{\varphi_1 \in \mathrm{CL}(\varphi)}{\varphi_1 \mid \neg\varphi_1}$$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$



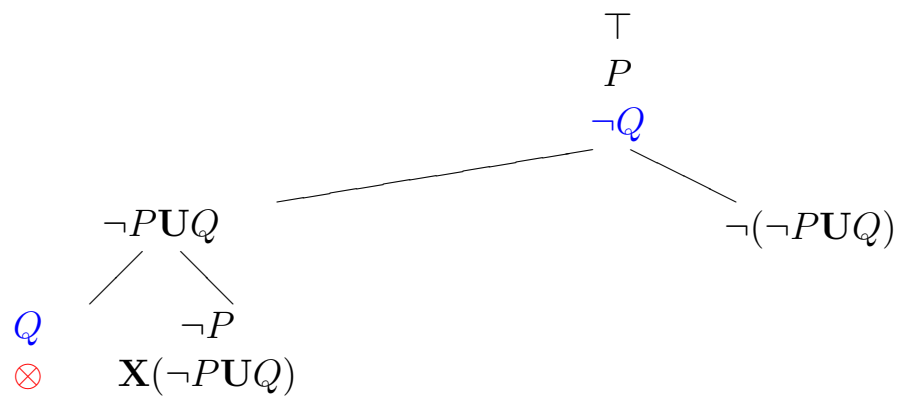
$(\varphi_1 \mathbf{U} \varphi_2)$	
φ_2	φ_1 $\mathbf{X}(\varphi_1 \mathbf{U} \varphi_2)$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

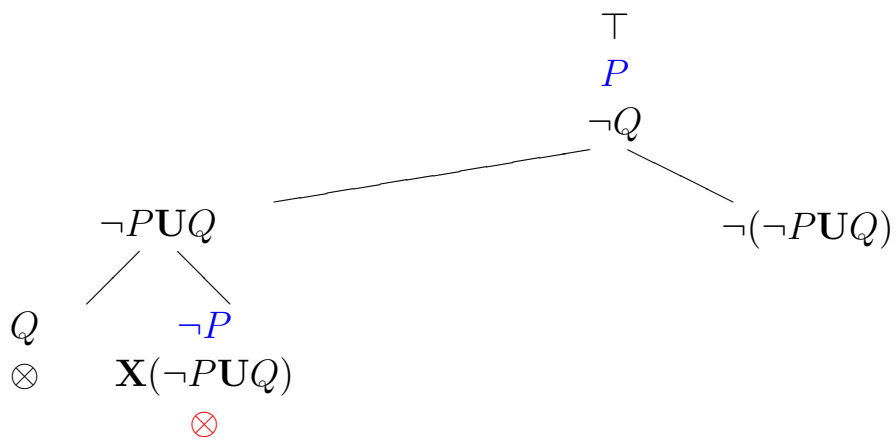


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

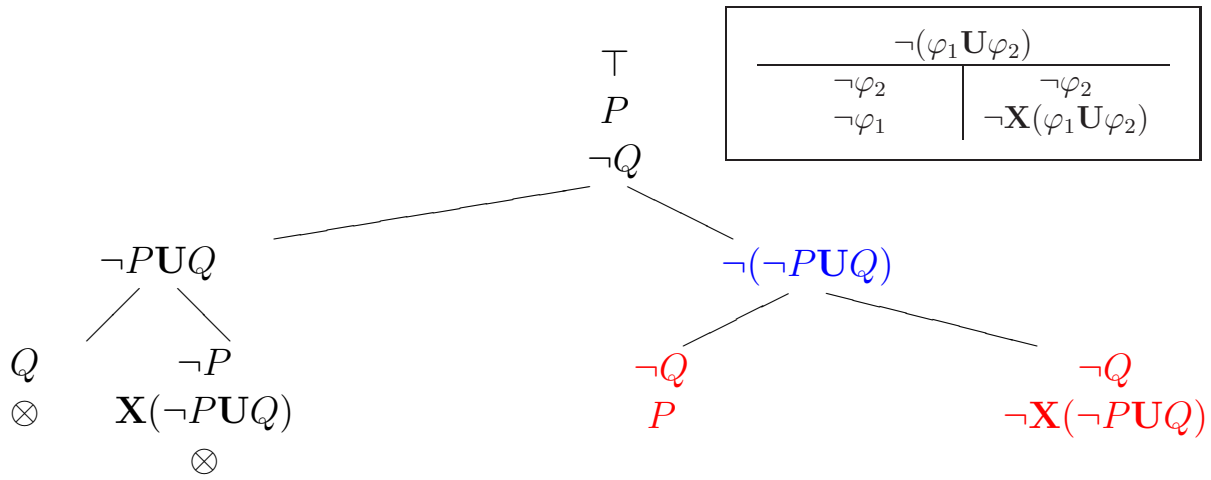


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$



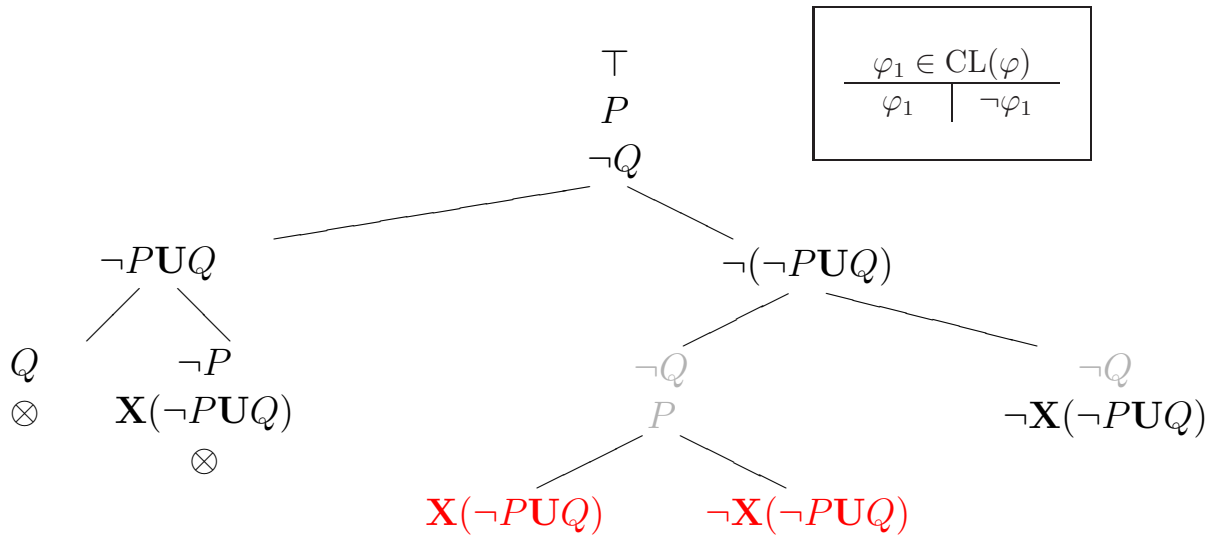
$\neg(\varphi_1 \mathbf{U} \varphi_2)$	
$\neg\varphi_2$ $\neg\varphi_1$	$\neg\varphi_2$ $\neg\mathbf{X}(\varphi_1 \mathbf{U} \varphi_2)$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$



$$\frac{\varphi_1 \in \mathrm{CL}(\varphi)}{\varphi_1 \mid \neg\varphi_1}$$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
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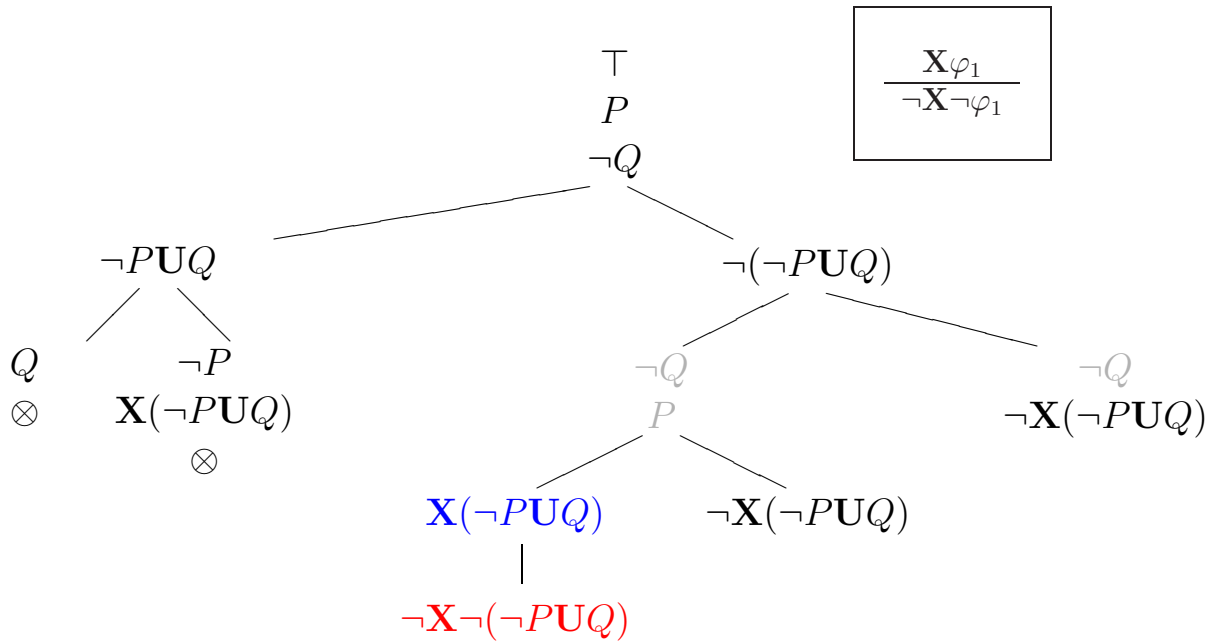
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

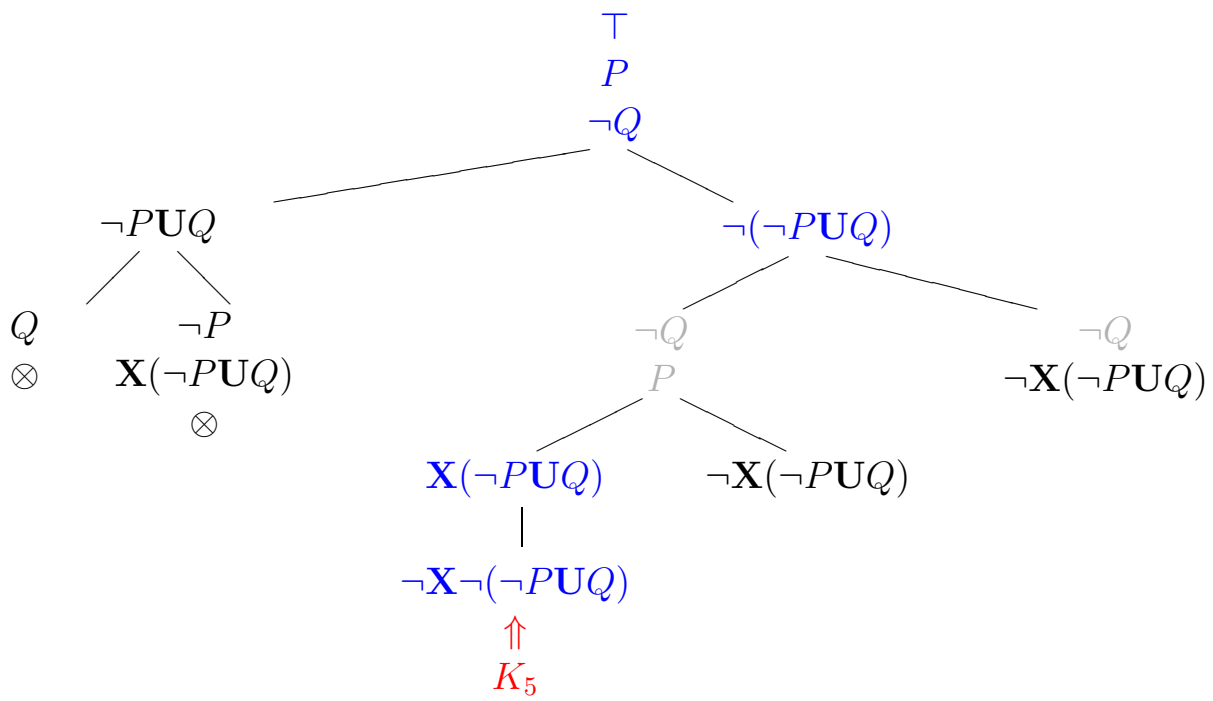


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

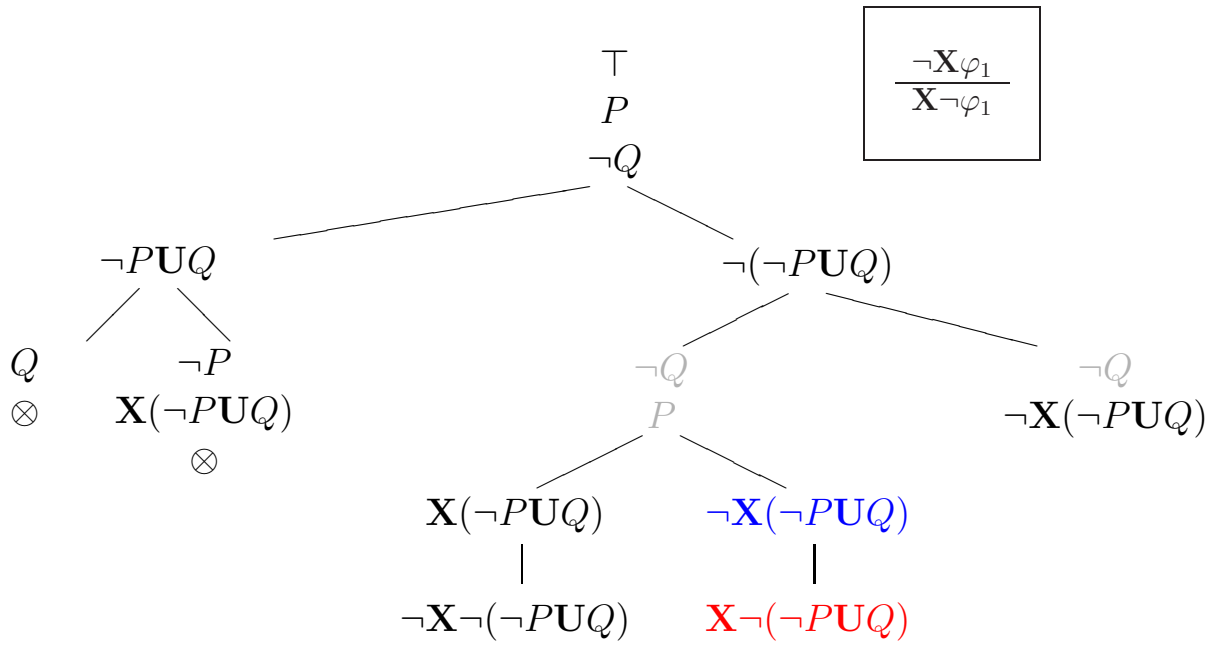


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

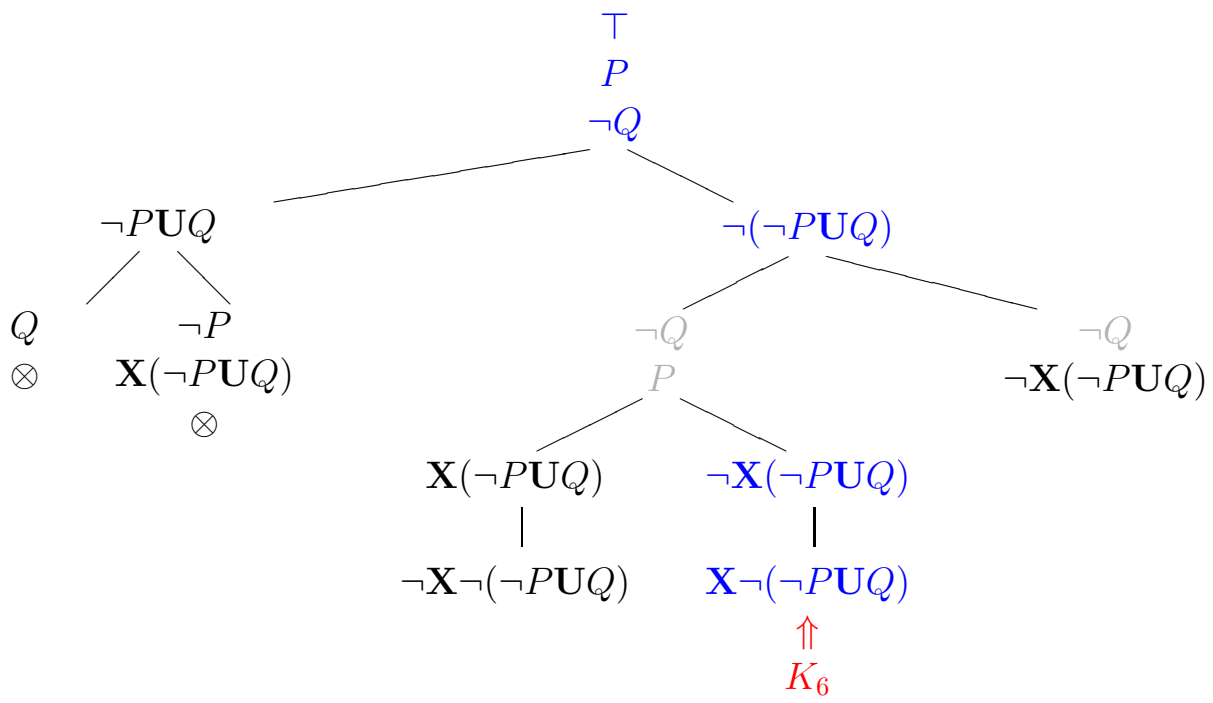


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

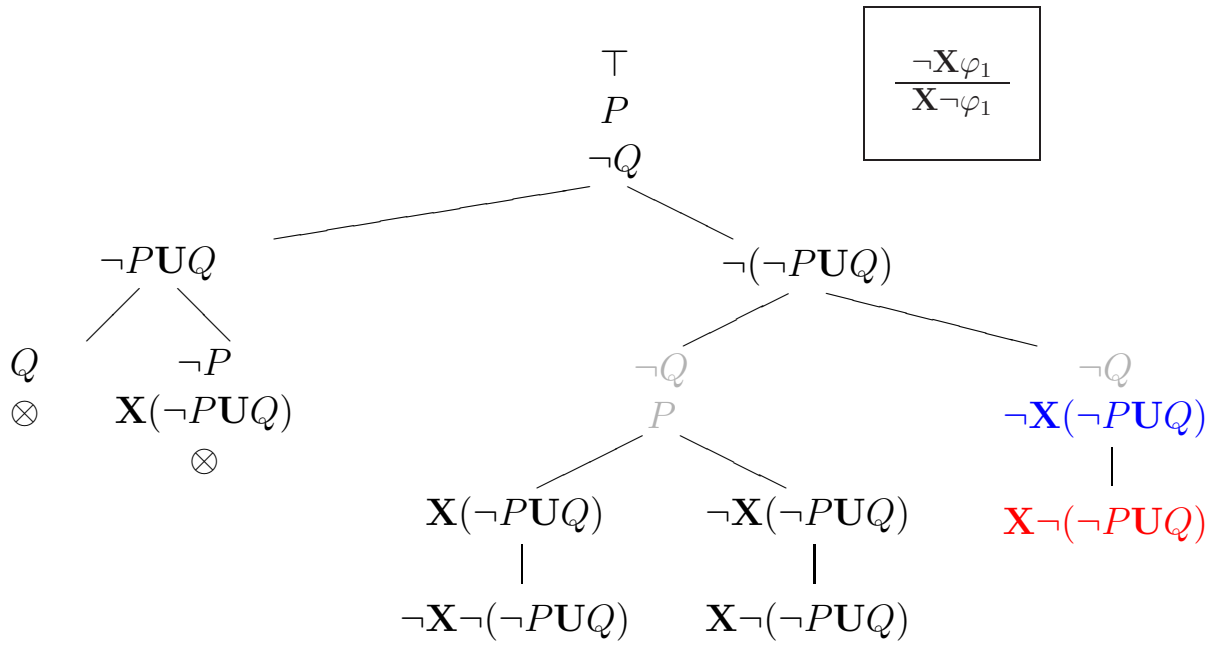


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_6 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$

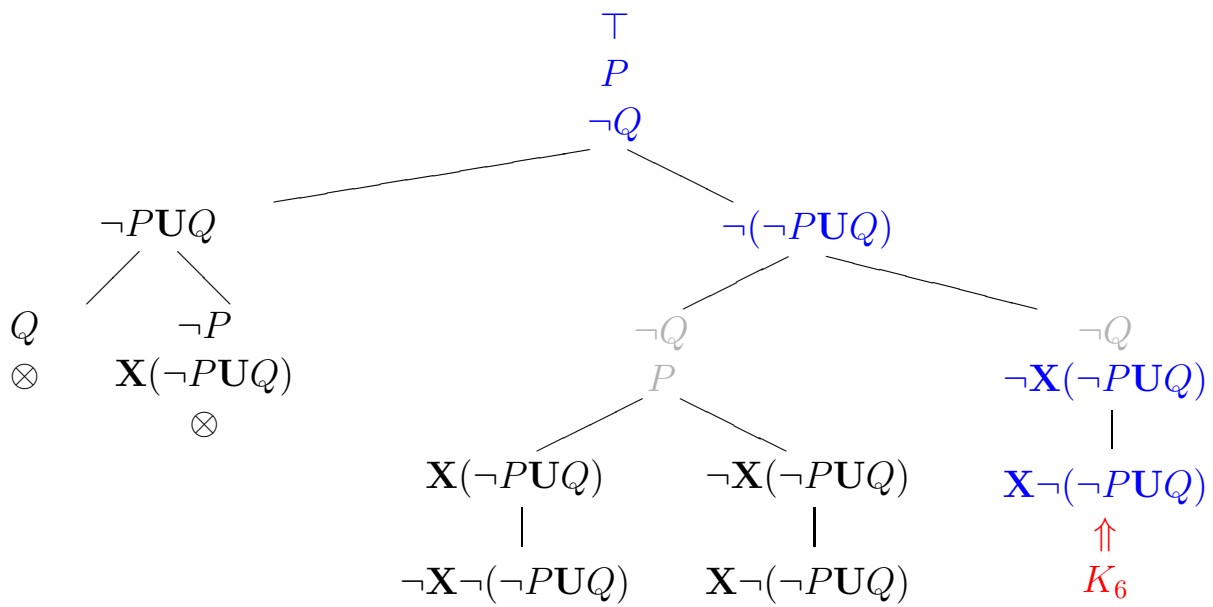


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_6 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

$v(d, P) = \text{true}$, $v(d, Q) = \text{false}$



Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_6 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

Tulkitaan atomit graafin G solmuiksi. Atomista (s, K) on kaari atomiin (s', K'), jos ja vain, jos

1. $(s, s') \in R$ (mallissa $\mathcal{M}$) ja
2. kaikille K:n muotoa $\mathbf{X}\varphi$ oleville lauseille pätee $\varphi \in K'$.

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$
\begin{aligned}
K_1 &= \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_2 &= \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_3 &= \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_4 &= \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_5 &= \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_6 &= \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}
\end{aligned}
$$

Tulkitaan atomit graafin G solmuiksi. Atomista (s, K) on kaari atomiin (s', K'), jos ja vain, jos

1. $(s, s') \in R$ (mallissa $\mathcal{M}$) ja
2. kaikille K:n muotoa $\mathbf{X}\varphi$ oleville lauseille pätee $\varphi \in K'$.

Jälkimmäisen ehdon perusteella saadaan K-joukkojen välille "yhteensopivuusrelaatio":

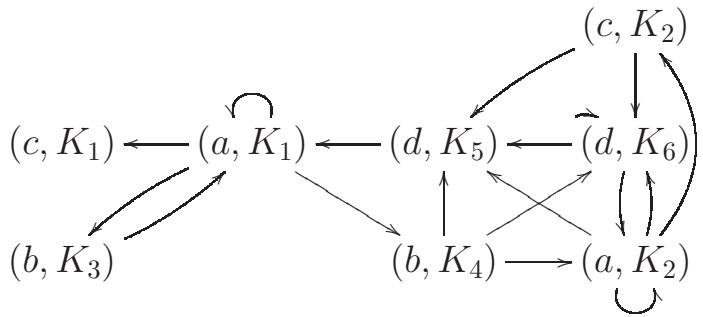
	K_1	K_2	K_3	K_4	K_5	K_6
K_1	$\times$		$\times$	$\times$		
K_2		$\times$			$\times$	$\times$
K_3	$\times$		$\times$	$\times$		
K_4		$\times$			$\times$	$\times$
K_5	$\times$		$\times$	$\times$		
K_6		$\times$			$\times$	$\times$

Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_6 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

Graafi G:

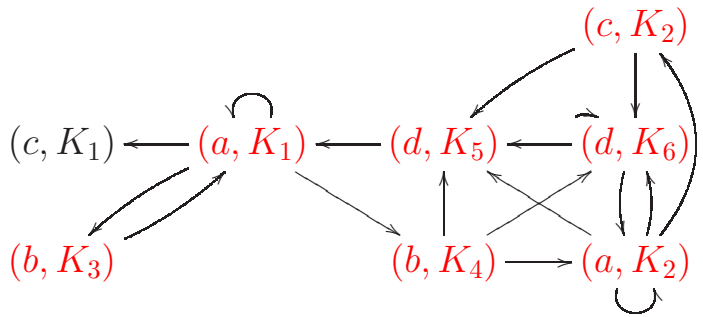


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$K_1 = \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_2 = \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_3 = \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_4 = \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_5 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$
$$K_6 = \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}$$

G:n ei-triviaalit vahvasti kytketyt komponentit:

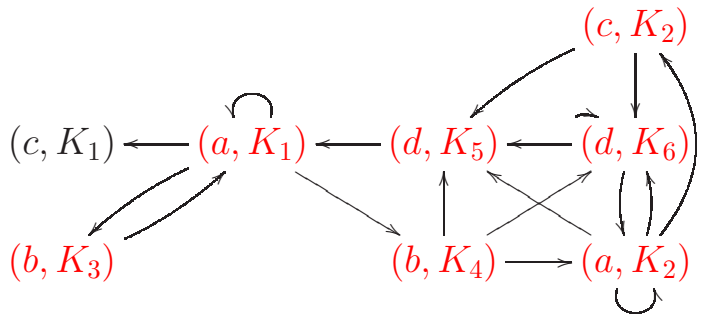


Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

$$
\begin{aligned}
K_1 &= \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_2 &= \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_3 &= \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_4 &= \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_5 &= \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_6 &= \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}
\end{aligned}
$$

G:n ei-triviaalit vahvasti kytketyt komponentit:



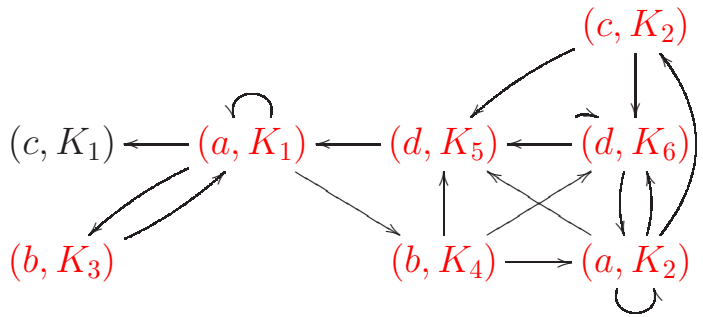
Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

Tämä ei-triviaali vahvasti kytketty komponentti on itsetoteutuva, sillä $\neg P\mathbf{U}Q$ on ainoa komponentin atomeissa esiintyvä muotoa $\varphi\mathbf{U}\psi$ oleva lause, ja komponentti sisältää esimerkiksi atomin (b, K_3), jolle pätee $Q \in K_3$.

$$
\begin{aligned}
K_1 &= \{\top, \neg P, \neg Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_2 &= \{\top, \neg P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_3 &= \{\top, P, Q, \neg P\mathbf{U}Q, \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_4 &= \{\top, P, Q, \neg P\mathbf{U}Q, \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_5 &= \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \mathbf{X}(\neg P\mathbf{U}Q), \neg\mathbf{X}\neg(\neg P\mathbf{U}Q)\} \\
K_6 &= \{\top, P, \neg Q, \neg(\neg P\mathbf{U}Q), \neg\mathbf{X}(\neg P\mathbf{U}Q), \mathbf{X}\neg(\neg P\mathbf{U}Q)\}
\end{aligned}
$$

G:n itsetoteutuvat ei-triviaalit vahvasti kytketyt komponentit:



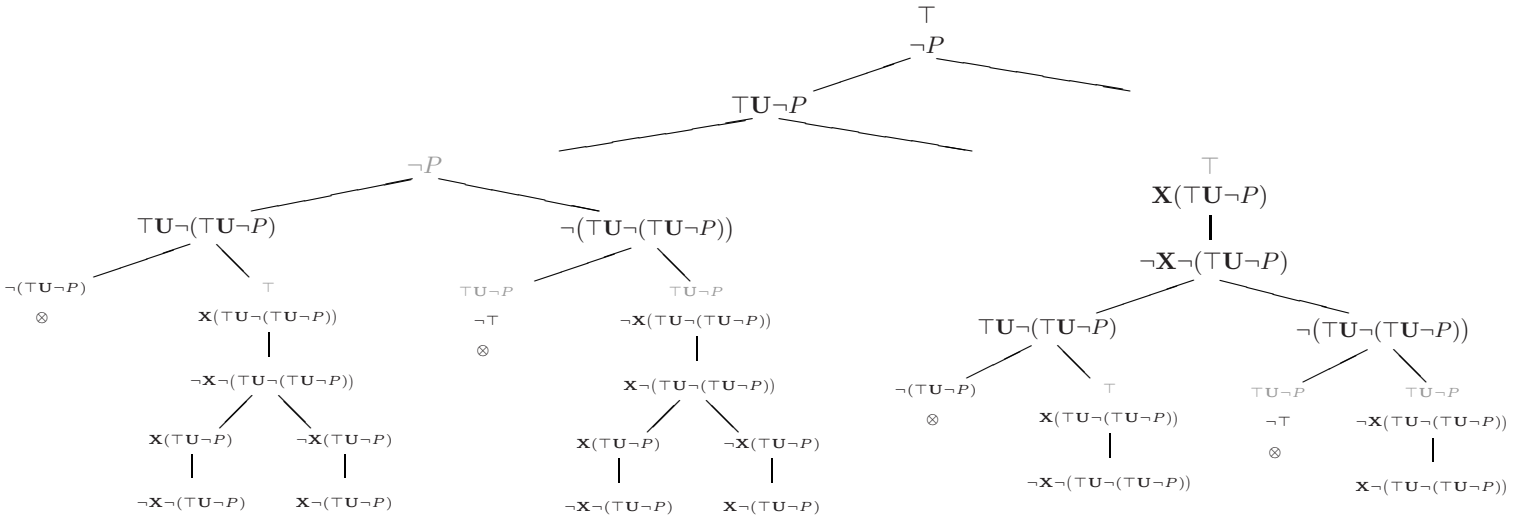
Atomit:

(a, K_1)
(c, K_1)
(a, K_2)
(c, K_2)
(b, K_3)
(b, K_4)
(d, K_5)
(d, K_6)

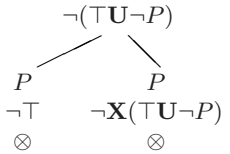
Koska lause $\mathbf{X}(\neg P \mathbf{U} Q)$ kuuluu esimerkiksi lausejoukkoon K_1 ja koska esimerkiksi atomista (a, K_1) on polku G:n itsetoteutuvaan vahvasti kytkettyyn komponenttiin (atomi itse kuuluu komponenttiin), seuraa, että $\mathcal{M}, a \models \mathbf{EX}(\neg P \mathbf{U} Q)$ pätee.

$$
\begin{aligned}
K_1 &= \{\top, \neg P, \neg Q, \neg P \mathbf{U} Q, \mathbf{X}(\neg P \mathbf{U} Q), \neg \mathbf{X} \neg (\neg P \mathbf{U} Q)\} \\
K_2 &= \{\top, \neg P, \neg Q, \neg (\neg P \mathbf{U} Q), \neg \mathbf{X}(\neg P \mathbf{U} Q), \mathbf{X} \neg (\neg P \mathbf{U} Q)\} \\
K_3 &= \{\top, P, Q, \neg P \mathbf{U} Q, \mathbf{X}(\neg P \mathbf{U} Q), \neg \mathbf{X} \neg (\neg P \mathbf{U} Q)\} \\
K_4 &= \{\top, P, Q, \neg P \mathbf{U} Q, \neg \mathbf{X}(\neg P \mathbf{U} Q), \mathbf{X} \neg (\neg P \mathbf{U} Q)\} \\
K_5 &= \{\top, P, \neg Q, \neg (\neg P \mathbf{U} Q), \mathbf{X}(\neg P \mathbf{U} Q), \neg \mathbf{X} \neg (\neg P \mathbf{U} Q)\} \\
K_6 &= \{\top, P, \neg Q, \neg (\neg P \mathbf{U} Q), \neg \mathbf{X}(\neg P \mathbf{U} Q), \mathbf{X} \neg (\neg P \mathbf{U} Q)\}
\end{aligned}
$$

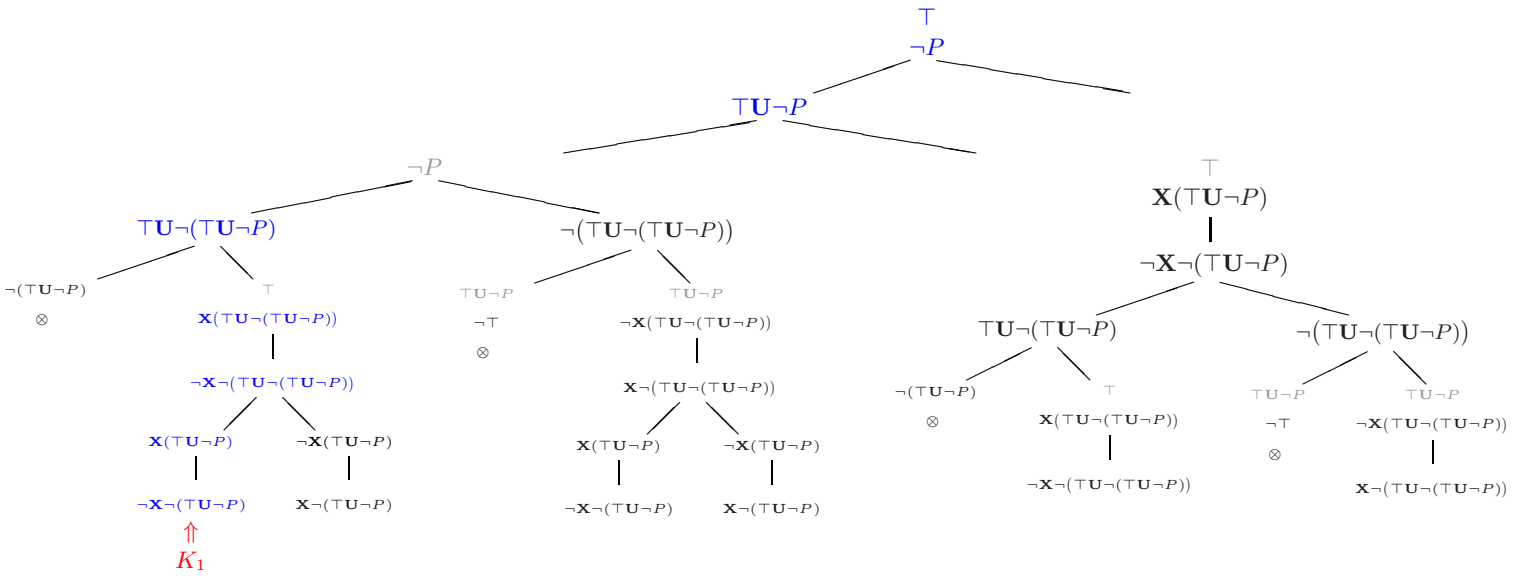
$v(a, P) = \text{false}$



Atomit:

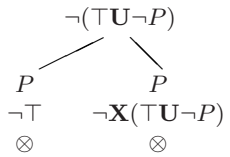


$v(a, P) = \text{false}$



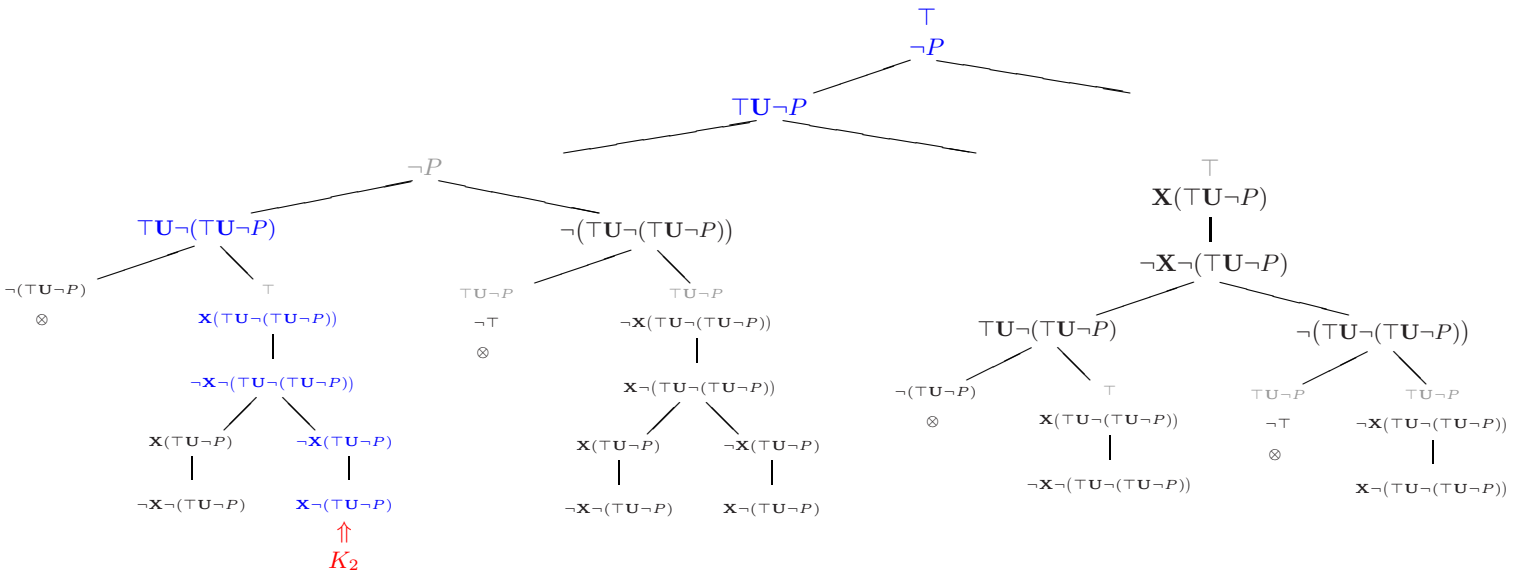
Atomit:

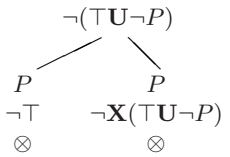
(a, K_1)



$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$

$v(a, P) = \text{false}$





Atomit:

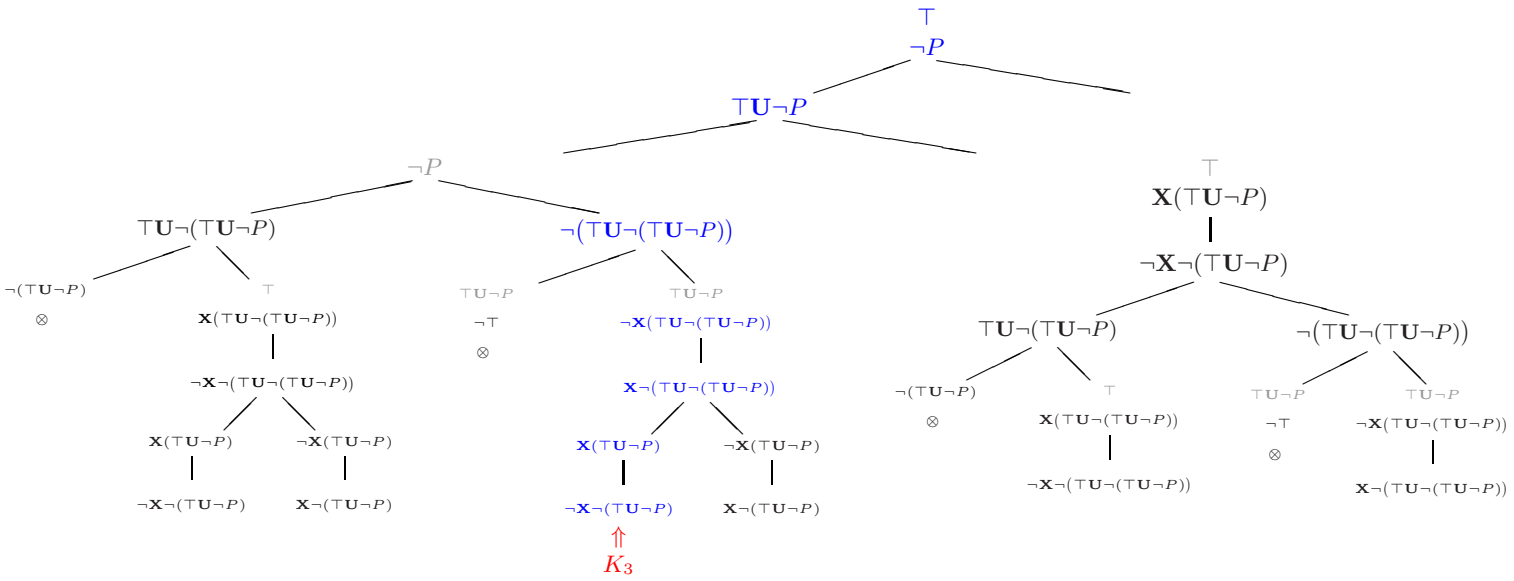
(a, K_1)

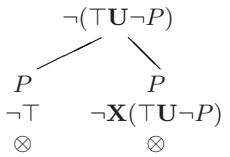
(a, K_2)

$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$

$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$

$v(a, P) = \text{false}$



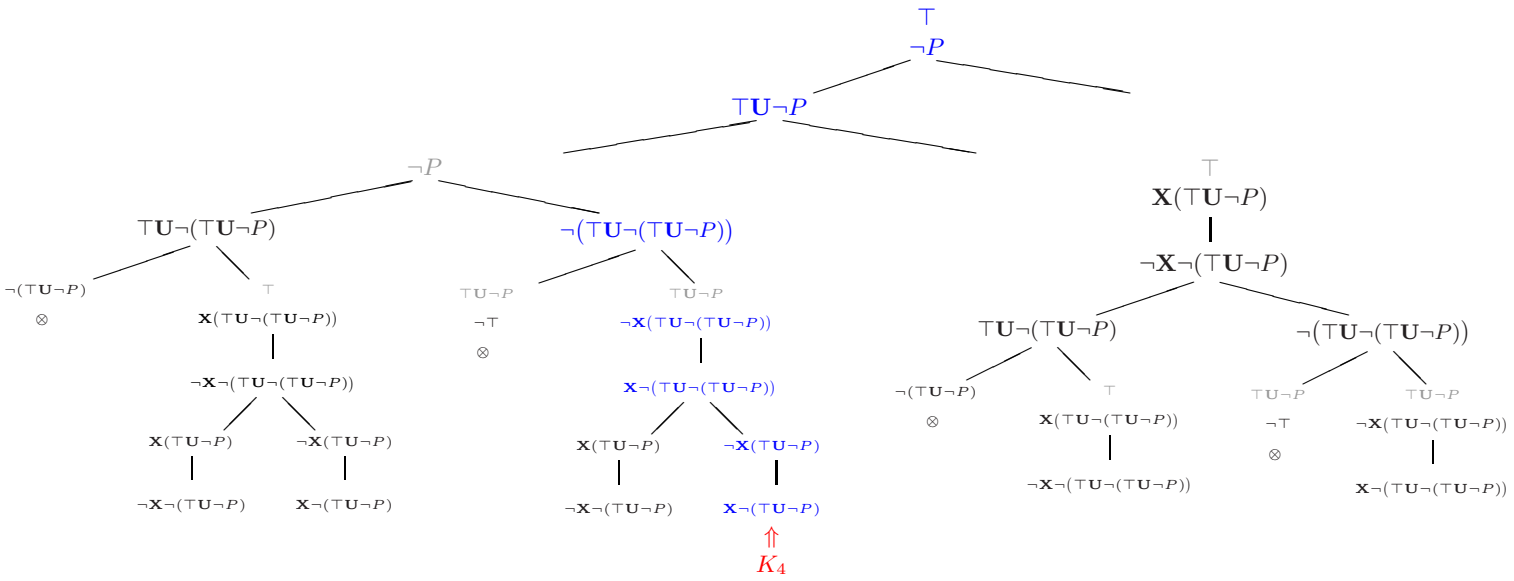


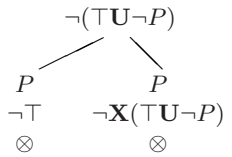
Atomit:

(a, K_1)
(a, K_2)
(a, K_3)

$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$
$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$
$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$

$v(a, P) = \text{false}$



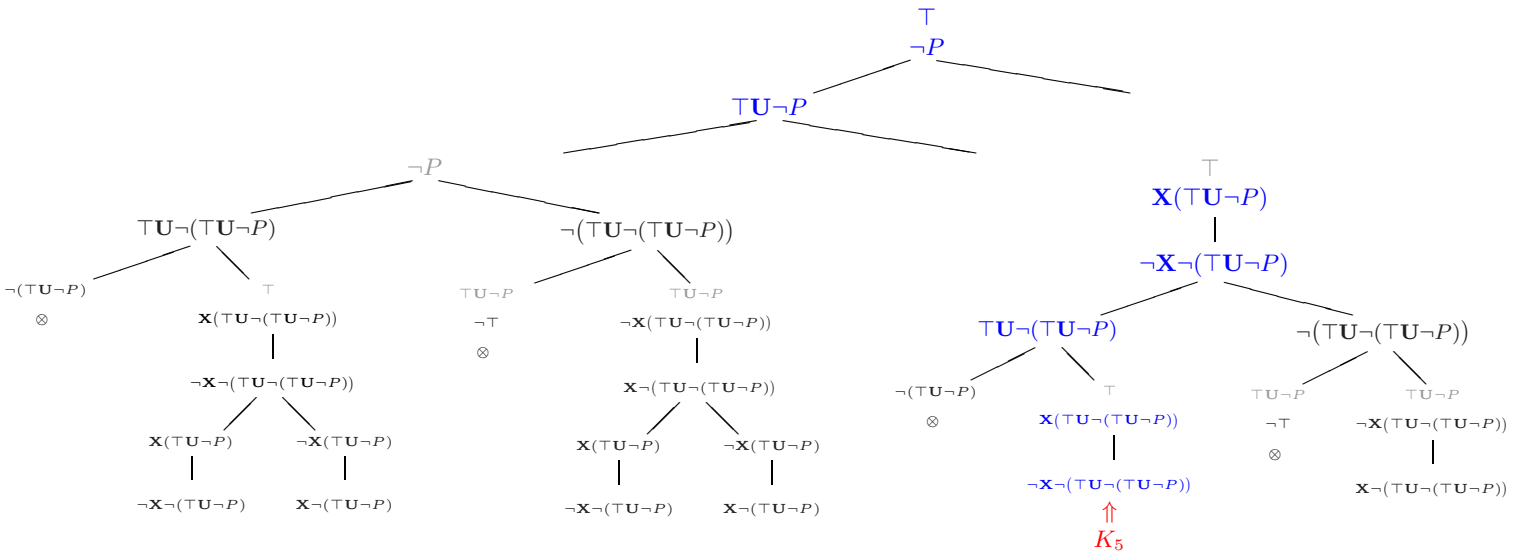


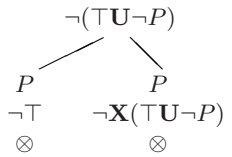
Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$

$v(a, P) = \text{false}$



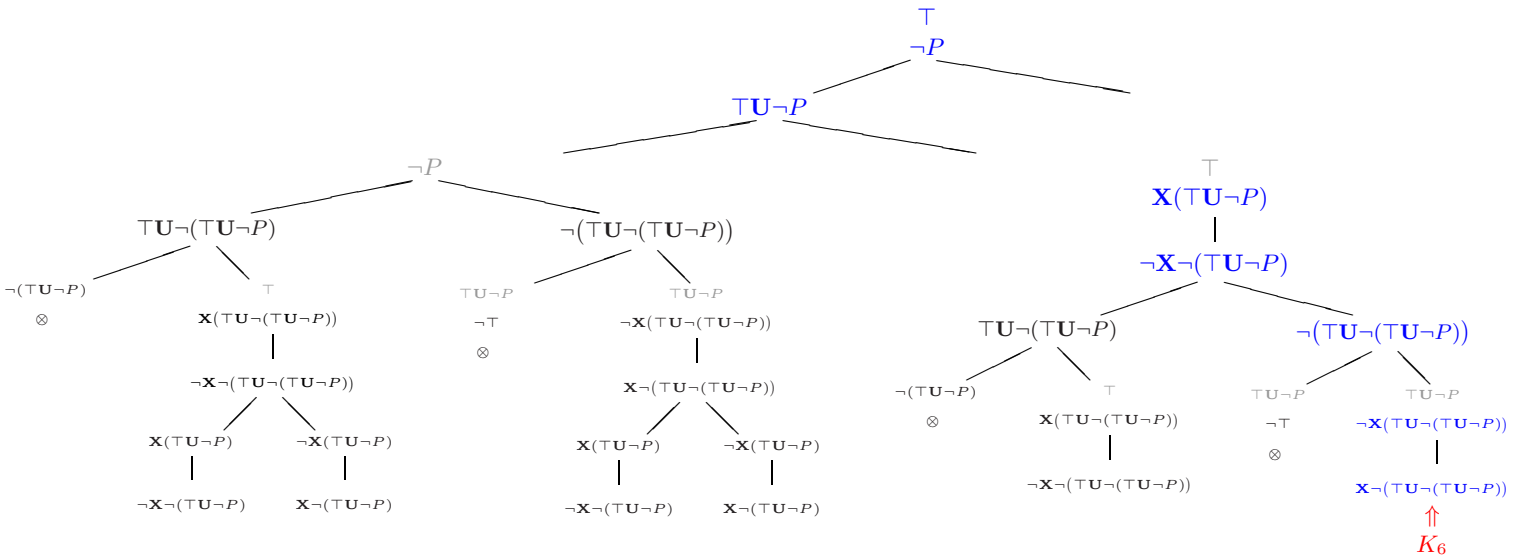


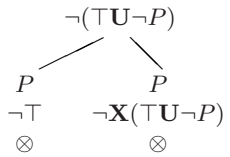
Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$

$v(a, P) = \text{false}$



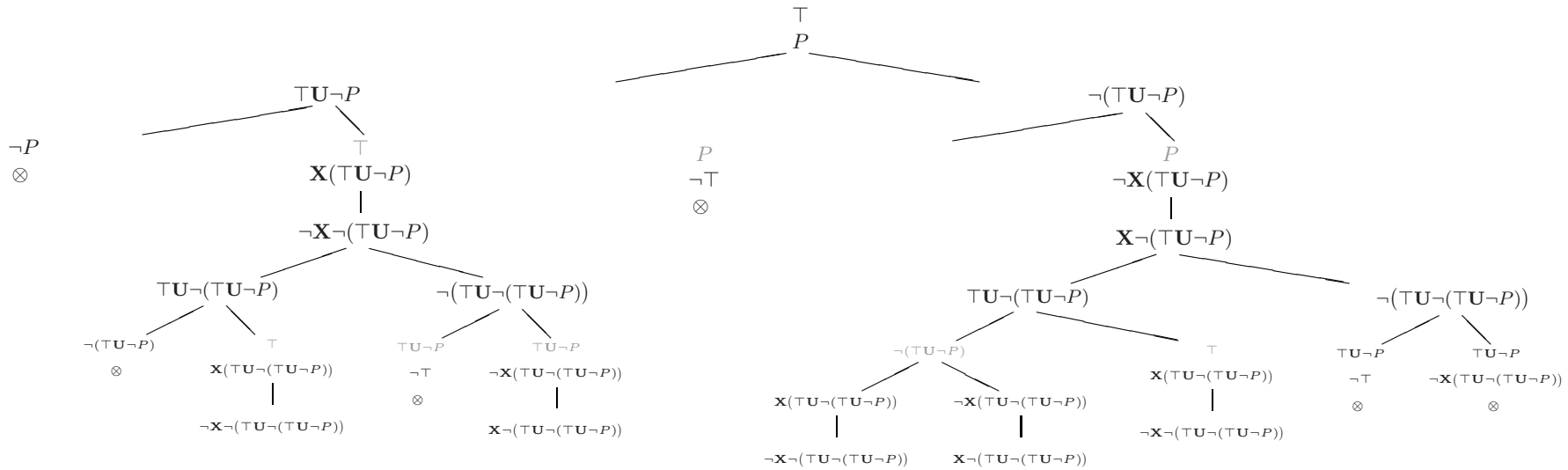


Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$

$v(b, P) = v(c, P) = \text{true}$

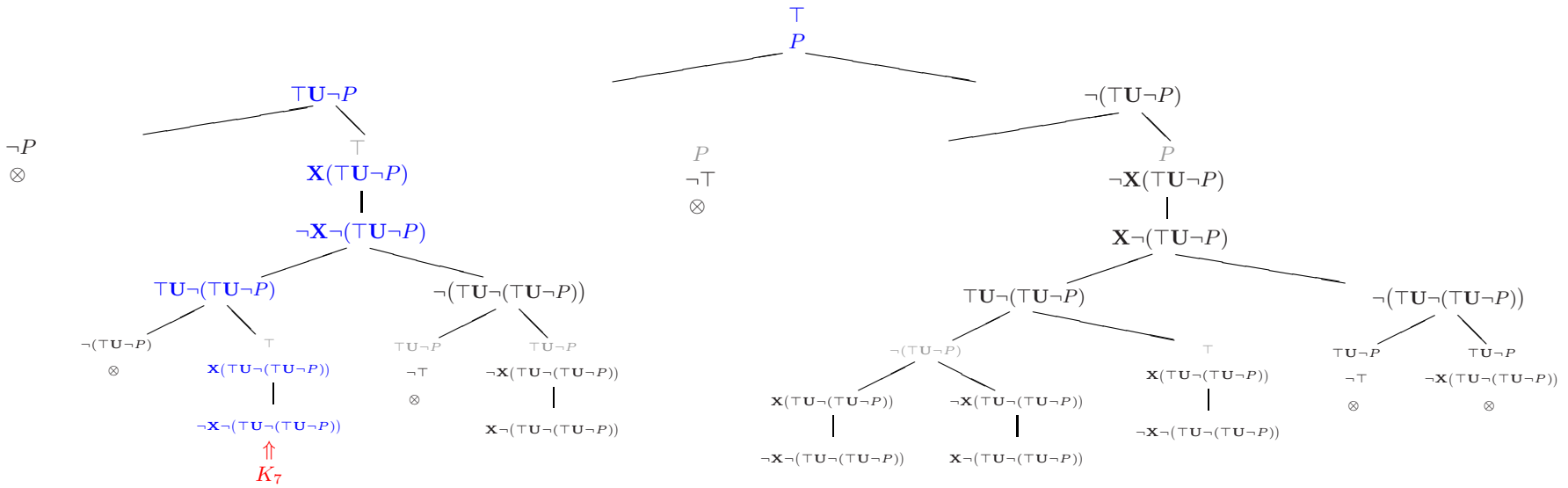


Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)

$$K_1 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_2 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_3 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_4 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_5 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_6 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$

$$v(b, P) = v(c, P) = \text{true}$$

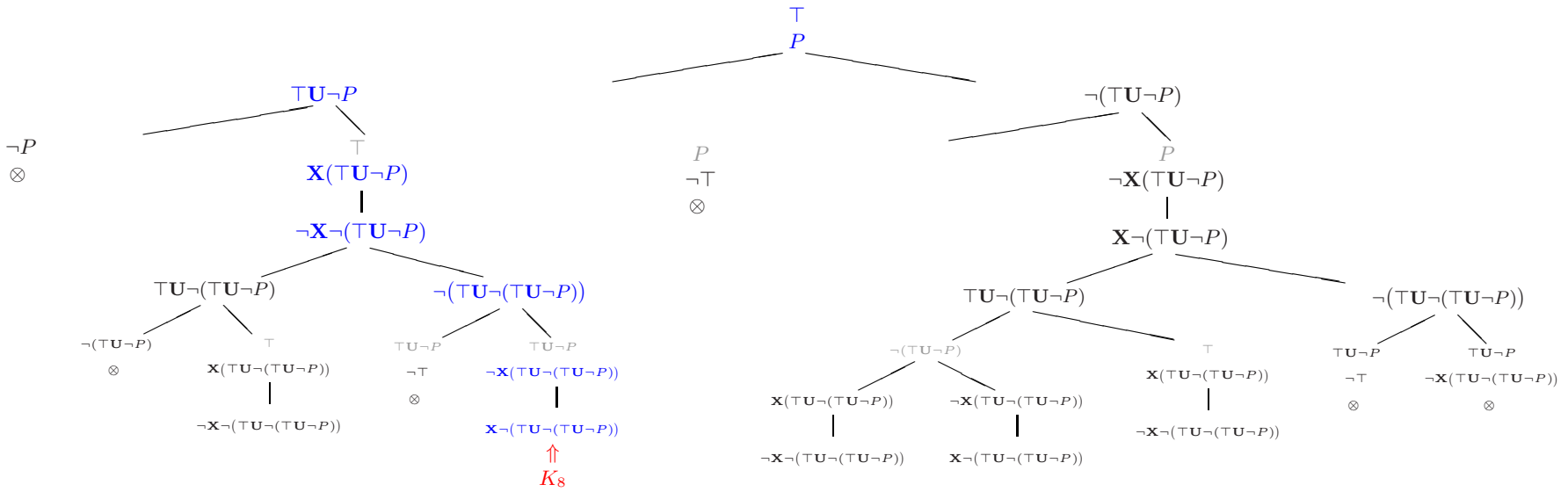


Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)
(b, K_7)
(c, K_7)

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_7 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$

$$v(b, P) = v(c, P) = \text{true}$$



Atomit:

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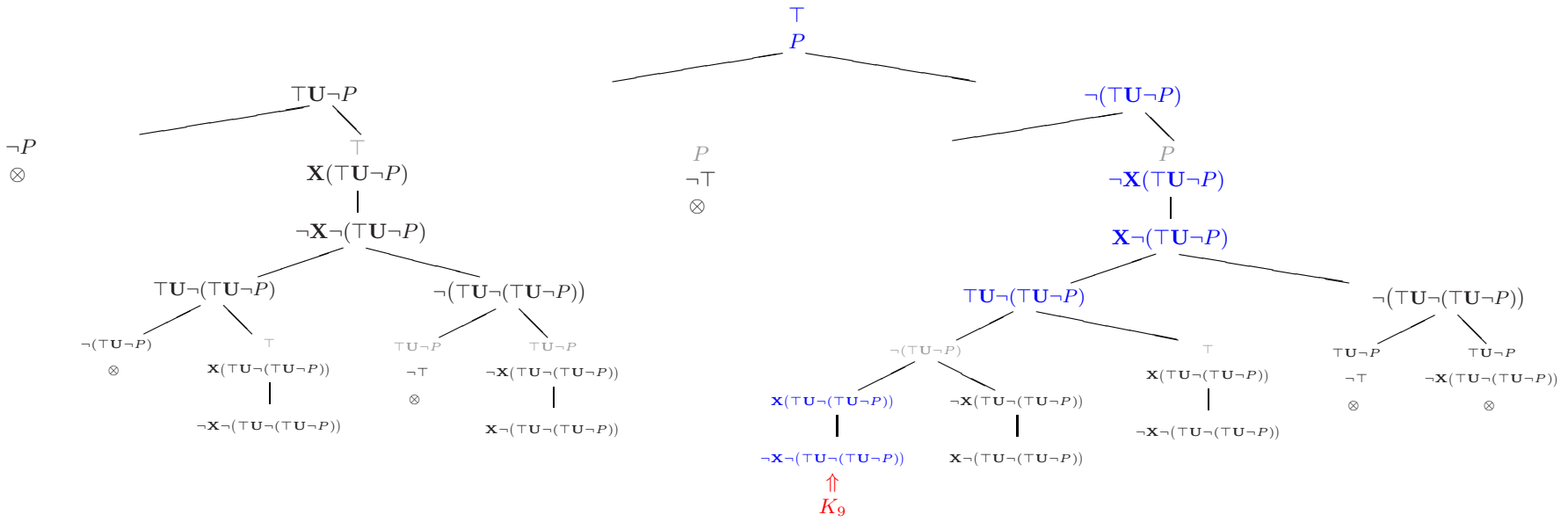
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)
(b, K_7)
(c, K_7)
(b, K_8)
(c, K_8)

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_7 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_8 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$

$$v(b, P) = v(c, P) = \text{true}$$



Atomit:

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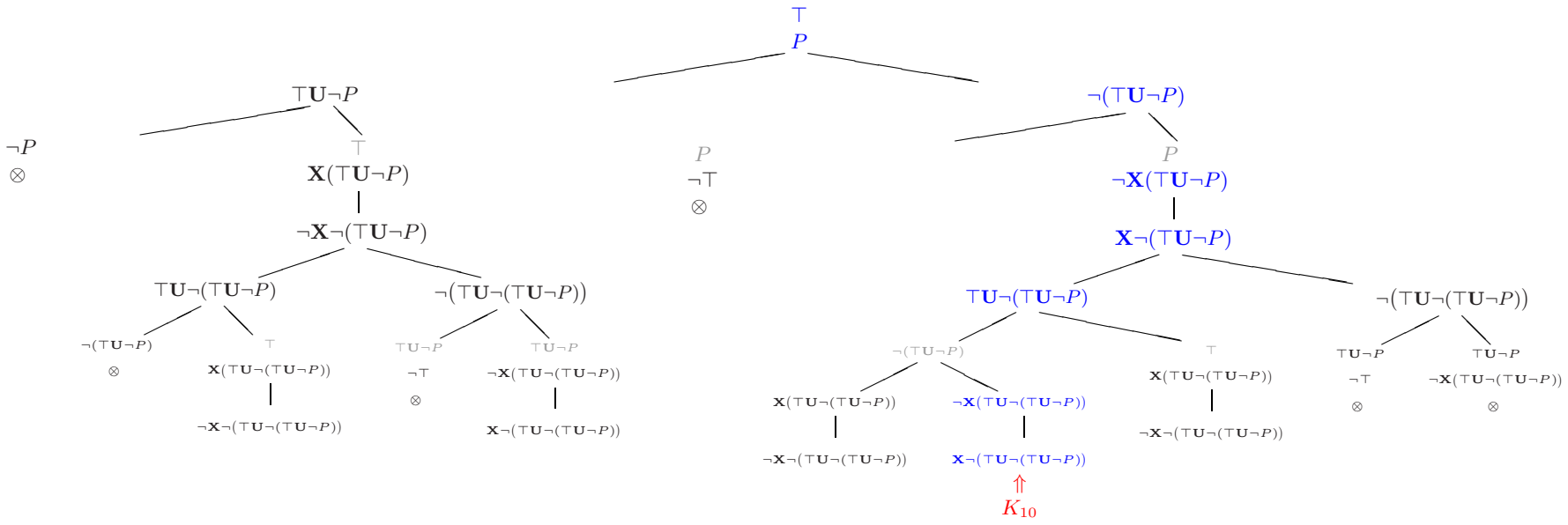
(a, K_4)
(a, K_5)
(a, K_6)
(b, K_7)
(c, K_7)
(b, K_8)
(c, K_8)
(b, K_9)
(c, K_9)

$$K_1 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_2 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_3 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_4 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_5 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_6 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_7 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_8 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_9 = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$

$$v(b,P) = v(c,P) = \text{true}$$



Atomit:

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(a, K_3)
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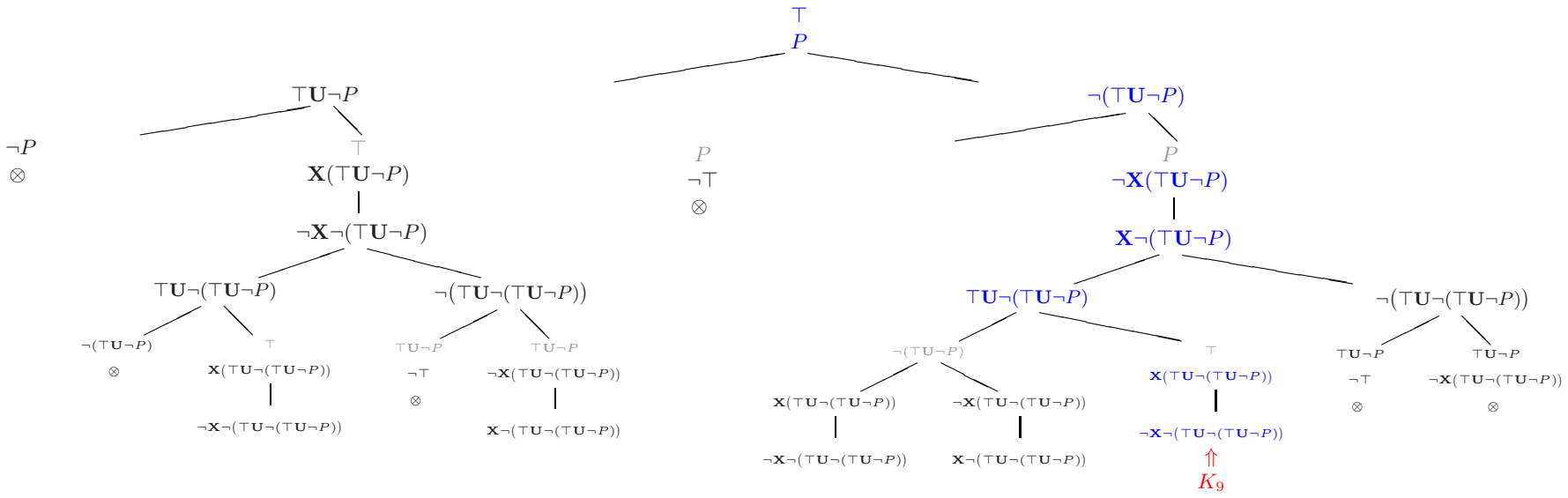
(a, K_6)
(b, K_7)
(c, K_7)
(b, K_8)
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_2 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_3 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_4 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_5 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_6 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_7 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_8 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_9 = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$
$$K_{10} = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P))\}$$

$$v(b, P) = v(c, P) = \text{true}$$



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(a, K_1)
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(c, K_7)
(b, K_8)
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_7 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_8 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg(\top \mathbf{U} \neg P), \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_9 = \{\top, P, \neg(\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$
$$K_{10} = \{\top, P, \neg(\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg(\top \mathbf{U} \neg P), \top \mathbf{U} \neg(\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg(\top \mathbf{U} \neg P)), \mathbf{X} \neg(\top \mathbf{U} \neg(\top \mathbf{U} \neg P))\}$$

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	K_1	K_2	K_3	K_4	K_5	K_6	K_7	K_8	K_9	K_{10}
K_1	×	×			×		×			
K_2									×	×
K_3			×	×		×		×		
K_4										
K_5	×	×			×		×			
K_6			×	×		×		×		
K_7	×	×			×		×			
K_8			×	×		×		×		
K_9									×	×
K_{10}										

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(a, K_1)
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(c, K_7)
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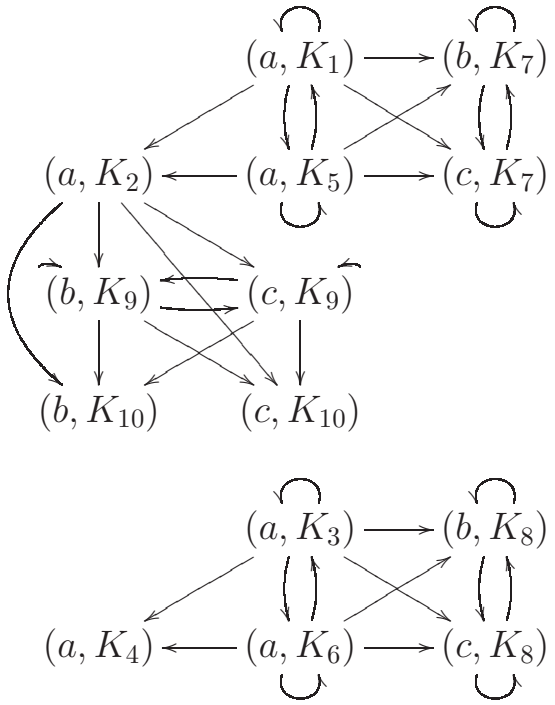
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_2 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_3 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_4 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_5 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_6 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_7 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_8 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_9 = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_{10} = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$

Graafi G:



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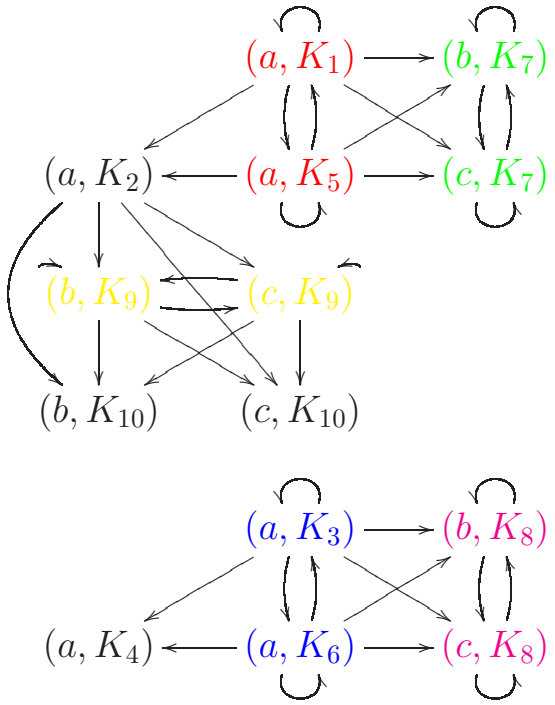
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_7 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_8 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_9 = \{\top, P, \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_{10} = \{\top, P, \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$

G:n ei-triviaalit vahvasti kytketyt komponentit:

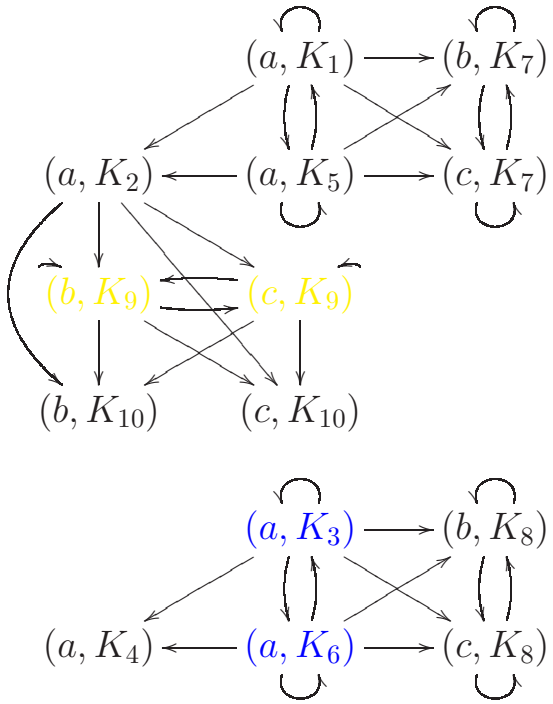


Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)
(b, K_7)
(c, K_7)
(b, K_8)
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_7 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_8 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_9 = \{\top, P, \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_{10} = \{\top, P, \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$

G:n itsetoteutuvat ei-triviaalit vahvasti kytketyt komponentit:

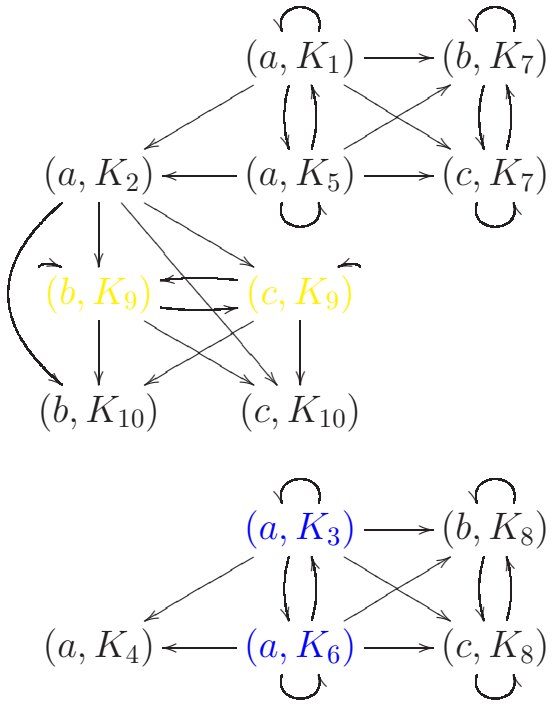


Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)
(b, K_7)
(c, K_7)
(b, K_8)
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_2 = \{\top, \neg P, \top \mathbf{U} \neg P, \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_3 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_4 = \{\top, \neg P, \top \mathbf{U} \neg P, \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P)\}$$
$$K_5 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_6 = \{\top, \neg P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_7 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_8 = \{\top, P, \top \mathbf{U} \neg P, \mathbf{X}(\top \mathbf{U} \neg P), \neg \mathbf{X} \neg (\top \mathbf{U} \neg P), \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_9 = \{\top, P, \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \neg \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$
$$K_{10} = \{\top, P, \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg P), \mathbf{X} \neg (\top \mathbf{U} \neg P), \top \mathbf{U} \neg (\top \mathbf{U} \neg P), \neg \mathbf{X}(\top \mathbf{U} \neg (\top \mathbf{U} \neg P)), \mathbf{X} \neg (\top \mathbf{U} \neg (\top \mathbf{U} \neg P))\}$$

G:n itsetoteutuvat ei-triviaalit vahvasti kytketyt komponentit:



Lause $\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)$ kuuluu esimerkiksi joukkoon K_6, ja G:ssä on polku atomista (a, K_6) itsetoteutuvaan komponenttiin (koska (a, K_6) kuuluu itsetoteutuvaan komponenttiin). Siten $\mathcal{M}, a \models \mathbf{E}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)$, joten $\mathcal{M}, a \not\models \mathbf{A}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)$.

Atomit:

(a, K_1)
(a, K_2)
(a, K_3)
(a, K_4)
(a, K_5)
(a, K_6)
(b, K_7)
(c, K_7)
(b, K_8)
(c, K_8)
(b, K_9)
(c, K_9)
(b, K_{10})
(c, K_{10})

$$K_1 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_2 = \{\top, \neg P, \top\mathbf{U}\neg P, \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_3 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_4 = \{\top, \neg P, \top\mathbf{U}\neg P, \neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P)\}$$
$$K_5 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_6 = \{\top, \neg P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_7 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_8 = \{\top, P, \top\mathbf{U}\neg P, \mathbf{X}(\top\mathbf{U}\neg P), \neg\mathbf{X}\neg(\top\mathbf{U}\neg P), \neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_9 = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \neg\mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$
$$K_{10} = \{\top, P, \neg(\top\mathbf{U}\neg P), \neg\mathbf{X}(\top\mathbf{U}\neg P), \mathbf{X}\neg(\top\mathbf{U}\neg P), \top\mathbf{U}\neg(\top\mathbf{U}\neg P), \neg\mathbf{X}\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big), \mathbf{X}\neg\big(\top\mathbf{U}\neg(\top\mathbf{U}\neg P)\big)\}$$