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Assignment 21

2.

σ	s0	s1	s2	s3	s4	...
p	F	T	F	T	F	...
q	F	F	T	F	T	...
r	F	F	F	F	T	...
pUq	F	T	T	T	T	...
qUr	F	F	T	F	T	...
pU(qUr)	F	T	T	T	T	...
(pUq)Ur	F	T	T	T	T	...

I believe that the until operator is associative because the parentheses can be moved around and not change the answer, the relations are still the same

3.

o(p ≡ q)
= <(3.80)>
o((p => q) ∧ (q => p))
= <(5)>
o(p => q) ∧ o(q => p)
= <(2) twice>
op => oq ∧ oq => op
= <(3.80)>
op ≡ oq //

4.

ofalse
= <(3.8)>
o¬true
= <(1)>
¬otrue
= <(7)>
¬true
= <(3.8)>
false //

5.

p U true ≡ true

= <(10)>

true ∨ (p ∧ o(p U q))

= <(3.24)>

(p ∧ o(p U q)) ∨ true

= <(3.29)>

true //

6.

♢p

= <(29)>

true U p

= <(10)>

p ∨ (true ∧ o(true U p))

= <(29)>

p ∨ (true ∧ o♢p)

= <(3.36)>

p ∨ (o♢p ∧ true)

= <(3.39)>

p ∨ o♢p //

7.

□□p

= <(43)>

¬♢¬□p

= <(51)>

¬♢♢¬p

= <(39)>

¬♢¬p

= <(43)>

□p

8.

□p

=> <(64)>

p

=> <(37)>

♢p //