Soluzione Esame 24/01/2022

Domanda 5

$D(x)$ = "x è un docente"

$S(x)$ = "x è uno studente"

$A(x,y)$ = "x odia y"

$B(x,y)$ = "ad x piace y"

a = Laura

① $\exists x (S(x) \wedge \forall y (D(y) \rightarrow A(x,y)))$

② $\forall x (D(x) \rightarrow \exists y (S(y) \wedge B(x,y)))$

③ $D(a) \wedge \forall x (S(x) \rightarrow B(a,x))$

Domanda 6

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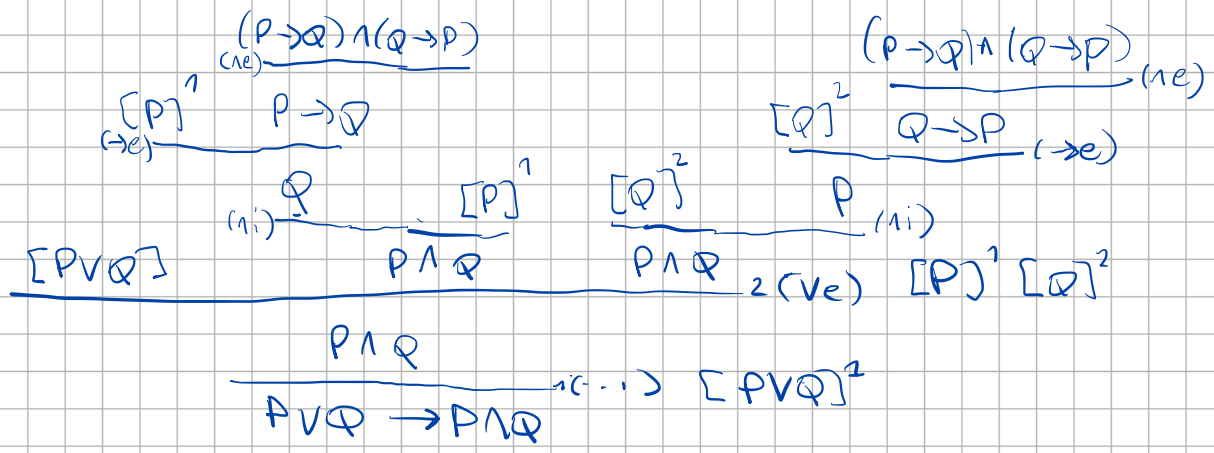

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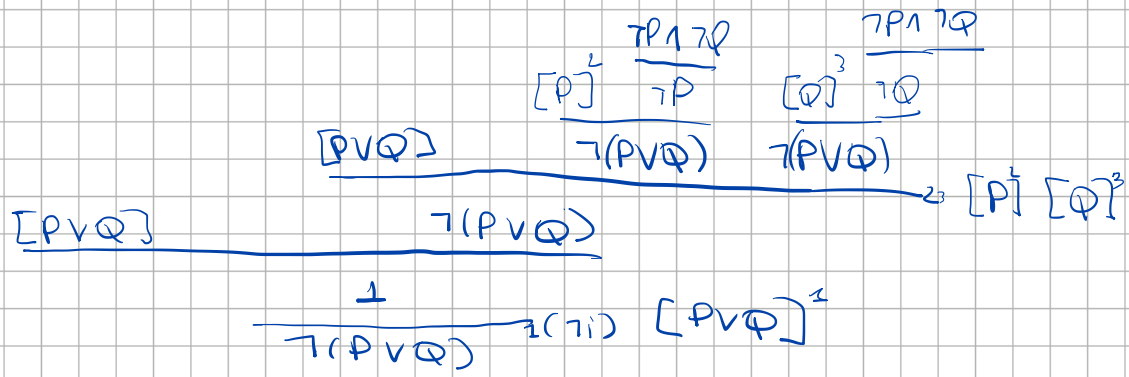

Domanda 7

$P = \exists x ((\neg A(x) \to B(x)) \to (A(x) \vee B(x)))$

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$$\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{}{A(a) \vdash A(a)}}{A(a) \vdash P, A(a)}(\forall r)}{A(a) \vdash P, A(a) \vee B(a)}(\neg r) \qquad \dfrac{\dfrac{\dfrac{}{B(a) \vdash B(a)}}{B(a) \vdash P, B(a)}(\forall r)}{B(a) \vdash P, A(a) \vee B(a)}}{\neg P, \neg A(a), A(a) \vee B(a)}$$

$$\dfrac{\dfrac{\dfrac{\neg A(a) \to B(a) \vdash P, A(a) \vee B(a)}{\vdash P, (\neg A(a) \to B(a)) \to (A(a) \vee B(a))}(\to r)}{\vdash \exists x ((\neg A(x) \to B(x)) \to (A(x) \vee B(x)))}(\exists r)}{}(\to s)$$

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1) $\neg \exists x ((\neg A(x) \to B(x)) \to (A(x) \vee B(x)))$
2) $\neg ((\neg A(a) \to B(a)) \to (A(a) \vee B(a)))$ (¬∃ da 1)
3) $\neg A(a) \to B(a)$
4) $\neg (A(a) \vee B(a))$] (¬ → da 2)
5) $\neg A(a)$
6) $\neg B(a)$] (¬ ∨ da 4)
7) $\neg A(a) \to B(a)$ — riscrivo 3)

$\neg\neg A(a)$ — $B(a)$] (→ da 7)

$A(a)$

Domanda 8

1) $\exists x\,(B(x) \wedge C(x)) \wedge \forall x\,(B(x) \to A(x)) \wedge \neg \exists x (C(x) \to C(f(x)))$

2) $\exists x\,(B(x) \wedge C(x)) \wedge \forall y\,(B(y) \to A(y)) \wedge \neg \exists z (C(z) \to C(f(z)))$

3) $\exists x\,(B(x) \wedge C(x)) \wedge \forall y\,(B(y) \to A(y)) \wedge \forall z (C(z) \to C(f(z)))$

4) $\exists x \forall y \forall z\,(B(x) \wedge C(x) \wedge (B(y) \to A(y)) \wedge \neg (C(z) \to C(f(z))))$

5) $\forall y \forall z\,(B(a) \wedge C(a) \wedge (B(y) \to A(y)) \wedge \neg (C(z) \to C(f(z))))$

6) $B(a) \wedge C(a) \wedge (\neg B(y) \vee A(y)) \wedge \neg (\neg C(z) \vee C(f(z)))$

7) $B(a) \wedge C(a) \wedge (\neg B(y) \vee A(y)) \wedge C(z) \wedge \neg C(f(z))$

8) $\{\{B(a)\}, \{C(a)\}, \{\neg B(y), A(y)\}, \{C(z)\}, \{\neg C(f(z))\}\}$

1) $\neg \exists x A(x)$

2) $\forall x \neg A(x)$

3) $\{\neg A(x)\}$