Ejercicios Unificación y Resolución

6.1

1. Sí es unificable. $\sigma = (x \mid f(z)) ; (y \mid a)$

2. Sí es unificable. $\sigma = (a \mid y) ; (x \mid g(f(y), b))$

3.

D	r	W	σ	|Wi|
		$Q(x, g(x,y)), Q(y,z), Q(z, g(y,a))$		3
$\{x,y\}$	$(x \mid y)$	$Q(y, g(y,y)), Q(y,z), Q(z, g(y,a))$	$(x \mid y)$	3
$\{g(y,y), z\}$	$(g(y,y) \mid z)$	$Q(y, z), Q(z, g(y,a))$		2
$\{y, z\}$	$(y \mid z)$	$Q(z,z), Q(z, g(z,a))$		2

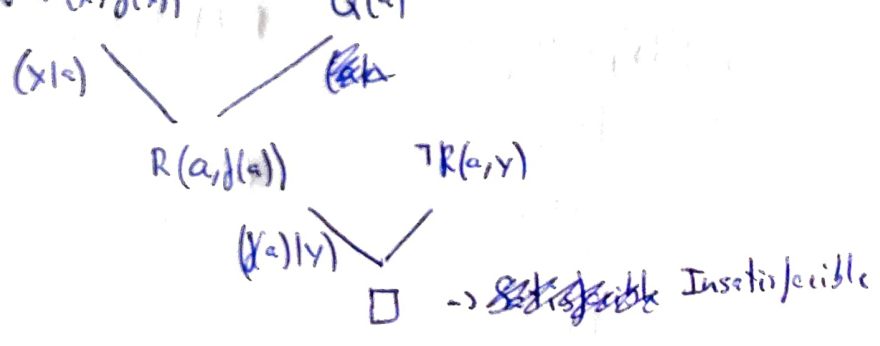
$\{z, g(z,a)\}$ → No es unificable

4.

D	r	W
		$R(f(x), g(f(z), y), g(a, f(f(x)))), R(y, g(f(a), f(y(b))), g(z, f(y)))$
$\{f(x), y\}$	$(f(x) \mid y)$	$R(y, \text{"} \quad g(a, f(y))), R(y, \text{"} \quad \text{"} \quad \text{"})$
[illegible]	[illegible]	$R(y, g(f(a), y), g(a, f(f(y)))), R(y, g(f(a), f(f(b)))), g(a, f(y))$
$\{y, f(f(b))\}$	$(f(f(b)) \mid y)$	→ Sí es unificable.

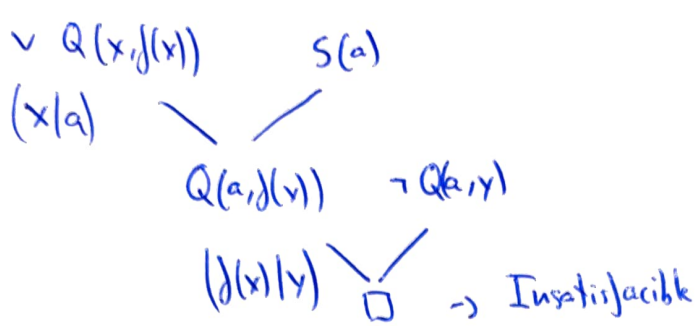
6.2

1. $\{ Q(a), \neg R(a,y), \neg Q(x) \vee R(x, f(x))$

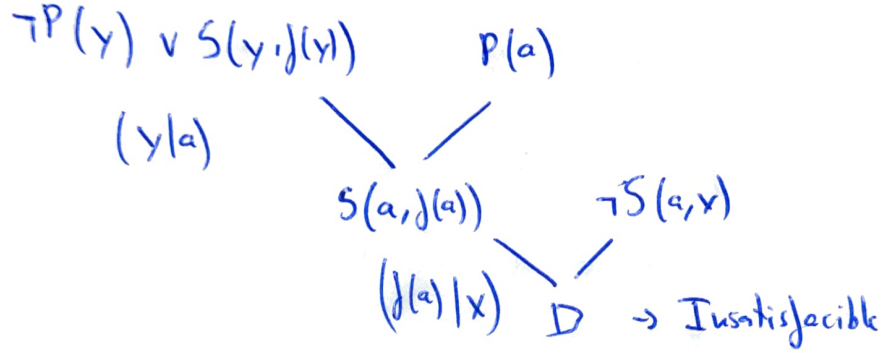


→ Insatisfacible

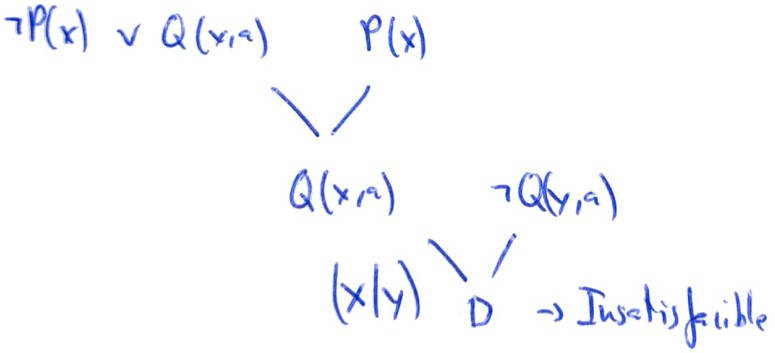
2. $\{\neg Q(a,y), \neg S(x) \vee Q(x,f(x)), S(a)\}$



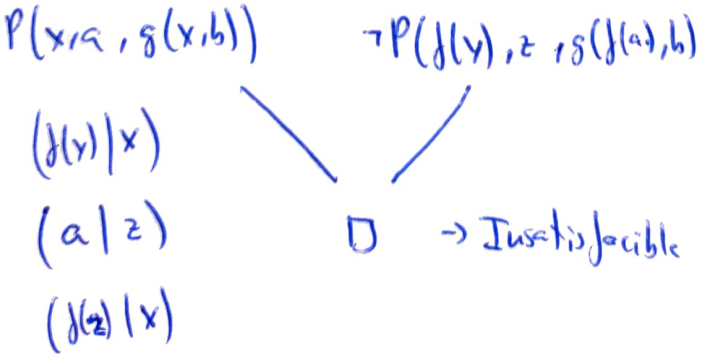
3. $\{P(a), \neg S(a,x), \neg P(y) \vee S(y,f(y))\}$



4. $\{P(x), \neg P(x) \vee Q(x,a), \neg Q(y,a)\}$



5. $\{P(x,a,g(x,b)), \neg P(f(y),z,g(f(a),b))\}$



6.3

Conclusión → $\neg\exists x\,(M(x) \wedge \neg D(x)) = \forall x\,\neg(M(x) \wedge \neg D(x)) = \forall x\,(\neg M(x) \vee D(x))$

1. $\forall y\,(\neg C(y) \to \exists x\,A(x,y)) = \forall y\,\exists x\,(\neg\neg C(y) \to A(x,y)) = \forall y\,(\neg\neg C(y) \to A(f(y),y))$

$= \forall y\,(C(y) \vee A(f(y),y))$ → FNC

2. $\forall x\,[\exists y\,(\neg C(y) \wedge A(x,y)) \to M(x)] = \forall x\forall y\,(\neg C(y) \wedge A(x,y) \to M(x)) =$

$= \forall x\forall y\,(C(y) \vee \neg A(x,y) \vee M(x))$ → FNC

3. $\forall x\,(D(x) \to M(x)) = \forall x\,(\neg D(x) \vee M(x))$ → FNC

4. $\forall x\,[(M(x) \wedge D(x)) \to \neg\exists y\,(\neg C(y) \wedge A(x,y))] =$

$= \forall x\forall y\,(M(x) \wedge D(x) \to \neg(\neg C(x) \wedge A(x,y))) =$

$= \forall x\forall y\,(\neg M(x) \vee \neg D(x) \vee C(x) \vee \neg A(x,y))$ → FNC

5. $\exists x\,\neg C(x) = \neg C(a)$ → FNC

{ 1., 2., 3., 4., 5. ~~$\neg M(x) \vee D(x)$~~, $\neg M(x) \vee D(x)$ }

$\neg M(x) \vee \neg D(x) \vee C(y) \vee \neg A(x,y)$ $\qquad$ $\neg M(x) \vee D(x)$

$\neg M(x) \vee C(y) \vee \neg A(x,y)$ $\qquad$ $C(y) \vee \neg A(x,y) \vee M(x)$

$C(y) \vee \neg A(x,y)$ $\qquad$ $C(y) \vee A(f(y),y)$

$(x \mid f(y))$

$C(y)$ $\qquad$ $\neg C(a)$

$(y \mid a)$

$\square$

6.4

$\exists x\,(P(x) \wedge \forall y\,(D(y) \rightarrow L(x,y)))$

$\exists x \forall y\,(P(x) \wedge (D(y) \rightarrow L(x,y)))$

$\forall y\,(P(a) \wedge (D(y) \rightarrow L(a,y)))$

$\forall y\,(P(a) \wedge (\neg D(y) \vee L(a,y)))$

$P(a) \wedge \forall y\,(\neg D(y) \vee L(a,y)) \rightarrow$ FNC (2 cláusulas)

$\forall x\,(P(x) \rightarrow \forall y\,(Q(y) \rightarrow \neg L(x,y)))$

$\forall x \forall y\,(P(x) \rightarrow (Q(y) \rightarrow \neg L(x,y)))$

$\forall x \forall y\,(\neg P(x) \vee \neg Q(y) \vee \neg L(x,y)) \rightarrow$ FNC (1 cláusula)

$\neg \forall x\,(D(x) \rightarrow \neg Q(x))$

$\exists x \neg (D(x) \rightarrow \neg Q(x))$

$\neg (D(b) \rightarrow \neg Q(b))$

$\neg (\neg D(b) \vee \neg Q(b))$

$D(b) \wedge Q(b) \rightarrow$ FNC (2 cláusulas)

$\{ P(a),\ \neg D(y) \vee L(a,y),\ \neg P(x) \vee \neg Q(y) \vee \neg L(x,y),\ D(b),\ Q(b) \}$ → Conjunto de Horn, parte de la negativa

$\neg P(x) \vee \neg Q(y) \vee \neg L(x,y)$ $\qquad$ $\neg D(y) \vee L(a,y)$

$(x|a)$ |

$\neg D(y) \vee \neg P(a) \vee \neg Q(y)$ $\qquad$ $P(a)$

|

$\neg D(y) \vee \neg Q(y)$ $\qquad$ $D(b)$

$(y|b)$ |

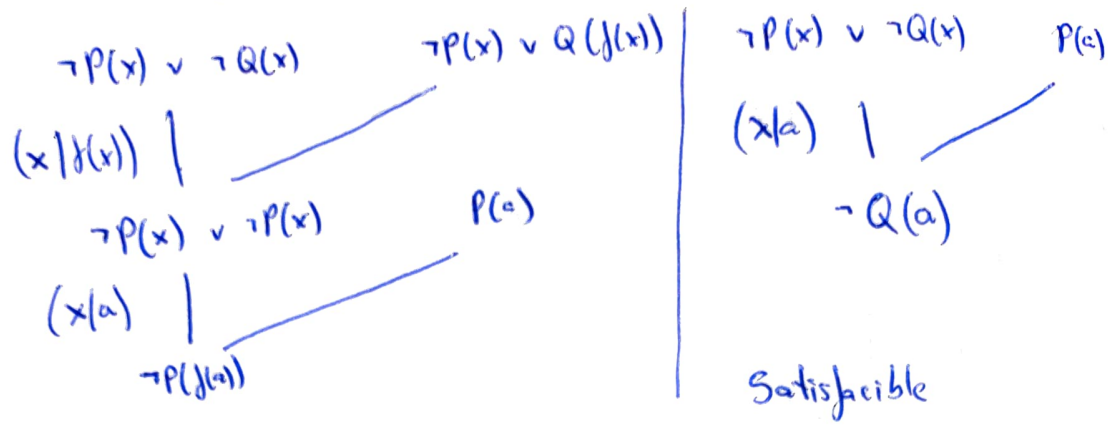
$\neg Q(b)$ $\qquad$ $Q(b)$

|

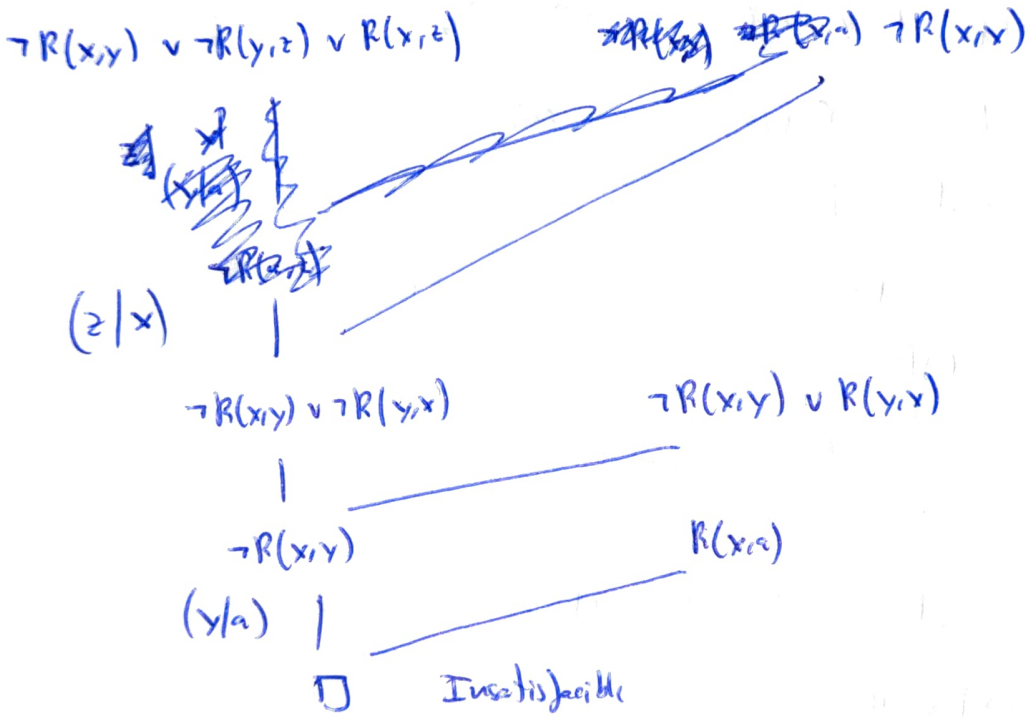
$\square$

6.5

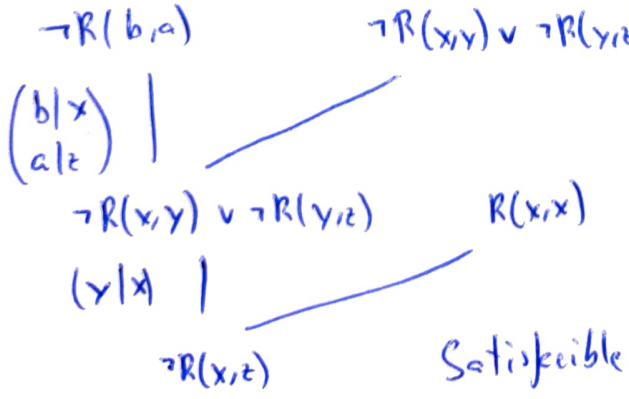
1. $\{\neg P(x) \vee Q(f(x)),\ P(a),\ \neg P(x) \vee \neg Q(x)\}$



2. $\{\neg R(x,y) \vee \neg R(y,z) \vee R(x,z),\ \neg R(x,y) \vee R(y,x),\ R(x,a),\ \neg R(x,x)\}$



3. $\{\neg R(x,y) \vee \neg R(y,z) \vee R(x,z),\ R(x,x),\ R(a,b),\ \neg R(b,a)\}$ Conjunto de Horn



4. $\{\neg R(x,y) \vee \neg R(y,z) \vee R(x,z), \neg R(x,y) \vee R(y,x), \neg R(x,x)\}$

$\neg R(x,x)$ → Satisfacible

5. $\{\neg E(x,y) \vee \neg E(x,z) \vee E(z,y), \neg E(x,y) \vee E(y,x), E(a,b), E(b,c), \neg E(a,c)\}$

$\neg E(a,c)$ $\qquad$ $E(a,b)$

(c/b) |

$\square$ → Insatisfacible

6. $\{A(j), \neg M(y) \vee P(j,y), \neg P(x,z), M(a), C(a)\}$

$\neg M(y) \vee P(j,y)$ $\qquad$ $M(a)$

(y/a) |

$P(j,a)$ $\qquad$ $\neg P(x,z)$

(j/x)
(a/z) |

$\square$ → Insatisfacible

7. $\{R(a), D(y) \vee S(a,y), \neg R(x) \vee \neg Q(y) \vee \neg S(x,y), \neg D(f(x)), Q(f(x))\}$

$\neg R(x) \vee \neg Q(y) \vee \neg S(x,y)$ $\qquad$ $R(a)$

(x/a) |

$\neg Q(y) \vee \neg S(a,y)$ $\qquad$ $D(y) \vee S(a,y)$

|

$\neg Q(y) \vee D(y)$ $\qquad$ $\neg D(f(x))$

$(y/f(x))$ |

$\neg Q(f(x))$ $\qquad$ $Q(f(x))$

|

$\square$ → Insatisfacible