

Representación con Lógica de Predicados (5ª semana)

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1. Ejercicio 8.6 del libro

1.1. Enunciado

Represent the following sentences in first-order logic, using a consistent vocabulary (which you must define):

1. Some students took French in spring 2001.
2. Every student who takes French passes it.
3. Only one student took Greek in spring 2001.
4. The best score in Greek is always higher than the best score in French.
5. Every person who buys a policy is smart.
6. No person buys an expensive policy.
7. There is an agent who sells policies only to people who are not insured.
8. There is a barber who shaves all men in town who do not shave themselves.
9. A person born in the UK, each of whose parents is a IJK citizen or a UK resident, is a UK citizen by birth.
10. A person born outside the UK, one of whose parents is a UK citizen by birth, is a UK citizen by descent.
11. Politicians can fool some of the people all of the time, and they can fool all of the people some of the time, but they can't fool all of the people all of the time.

1.2. Resolución

1. $\exists s \text{ isStudent}(s) \rightarrow \exists c \text{ tookClases}(s, \text{French})$
2. $\forall s \text{ isStudent}(s) \wedge \exists c \text{ tookClases}(s, \text{French}) \rightarrow \exists c \text{ passClass}(s, \text{French})$
3. $\exists s \text{ isStudent}(s) \wedge \exists g \text{ tookClassOn}(s, \text{Greek}, \text{spring } 2001) \wedge \forall x \ x \neq s \rightarrow \neg \text{tookClassOn}(x, \text{Greek}, \text{spring } 2001)$
4. $\forall c \text{ isBestCalificationOfGreek}(g) \wedge \forall f \text{ isBestCalificationOfFrench}(f) \rightarrow \text{isHigher}(g, f)$
5. $\exists p \text{ isPerson}(p) \wedge \exists l \text{ isPolicy}(l) \rightarrow \forall \text{ buys}(p, l) \rightarrow \text{isWhise}(p)$
6. $\exists p \text{ isPerson}(p) \wedge \exists l \text{ isPolicy}(l) \wedge \text{isExpensive}(p) \rightarrow \neg \text{buys}(p, l)$
7. $\exists p \text{ isPerson}(p) \wedge \exists a \text{ isAgent}(a) \wedge \exists l \text{ isPolicy}(l) \rightarrow \text{sells}(a, l) \wedge \text{sellsTo}(a, p)$
8. $\exists p \text{ isPerson}(p) \wedge \exists b \text{ isBarber}(b) \wedge \exists t \text{ isTown}(t) \wedge \text{dontShaveHimself}(p) \wedge \text{livesIn}(p, t) \wedge \text{livesIn}(b, t) \rightarrow \text{shaves}(b, p)$
9. $\exists p1 \text{ isPerson}(p1) \wedge \exists p2 \text{ isPerson}(p2) \wedge \exists s \text{ isPerson}(s) \wedge \text{bornInUK}(p1) \wedge \text{bornInIJK}(p2) \wedge \text{bornInUK}(s) \rightarrow \text{haveUKNationalityByBirth}(s)$

10. $\exists p1 \text{ isPerson}(p1) \wedge \exists p2 \text{ isPerson}(p2) \wedge \exists s \text{ isPerson}(s) \wedge \text{bornInUK}(p1) \wedge \text{bornInUK}(p2) \rightarrow \text{haveUKNationalityByDescent}(s)$
11. $\exists Po \text{ isPolitician}(po) \wedge \exists Pe \text{ isPerson}(pe) \wedge \forall all \text{ isPerson}(all) \rightarrow (\text{foolAllOfTheTime}(po, pe) \vee \text{foolSomeOfTheTime}(po, all)) \wedge \neg \text{foolAllOfTheTime}(po, all)$

2. Ejercicio 8.7 del libro

2.1. Enunciado

Represent the sentence "All Germans speak the same languages" in predicate calculus. Use $\text{Speaks}(x, l)$, meaning that person x speaks language l .

2.2. Resolución

$$\forall g \exists l \text{ Speaks}(g, l)$$

3. Ejercicio 8.8 del libro

3.1. Enunciado

What axiom is needed to infer the fact $\text{Female}(\text{Laura})$ given the facts $\text{Male}(\text{Jim})$ and $\text{Spouse}(\text{Jim}, \text{Laura})$?

3.2. Resolución

$$\text{Husband}(\text{Jim})$$

4. Ejercicio 8.9 del libro

4.1. Enunciado

Write a general set of facts and axioms to represent the assertion "Wellington heard about Napoleon's death." and to correctly answer the question "Did Napoleon hear about Wellington's death?"

4.2. Resolución

$$\text{HeardAbout}(Wallington, \text{stateOf}(\text{Napoleon})) \wedge \text{isDead}(\text{Napoleon})$$

5. Ejercicio 4 de la relación

5.1. Enunciado

Representa los siguientes hechos con lógica de predicados:

- Algunas plantas no tienen flores
- Cualquier edificio es habitable

- No hay delito sin causa
- Algunas personas son insoportables
- Existen personas que no comen carne
- No es oro todo lo que reluce
- Ningún asesino es bondadoso
- El que estudia, aprueba
- No todos los animales son racionales
- Existen personas que aman a todo el mundo
- No es verdad que todas las personas no amen a todo el mundo

5.2. Resolución

- $\exists p \text{ esPlanta}(p) \wedge \neg \text{tiene}(p, \text{flores})$
- $\forall e \text{ esEdificio}(e) \rightarrow \text{esHabitable}(e)$
- $\neg \exists d \text{ esDelito}(d) \wedge \exists c \text{ esCausa}(c) \wedge \text{esCausaDe}(c, d)$
- $\exists p \text{ esPersona}(p) \wedge \text{esInsoportable}(p)$
- $\exists p \text{ esPersona}(p) \wedge \neg \text{come}(p, \text{carne})$
- $\exists x \text{ reluce}(x) \wedge \neg \text{esOro}(x)$
- $\neg \exists a \text{ esAsesino}(a) \wedge \text{esBondadoso}(a)$
- $\forall x, y \text{ estudia}(x, y) \rightarrow \text{aprueba}(x, y)$
- $\neg \forall a \text{ esAnimal}(a) \wedge \text{esRacional}(a)$
- $\exists p \text{ esPersona}(p) \wedge \forall all \text{ isPersona}(all) \wedge \text{amar}(p, all)$
- $\neg \forall p \text{ esPersona}(p) \wedge \forall all \text{ isPersona}(all) \wedge \neg \text{amar}(p, all)$