Lógica proposicional
(5^{a} semana)

March 10, 2018

1 ejercicio 8.6

1.1 enunciado

epresent 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, acitizen by descent.
11. Politicians can fool some of the people all of time, they can fool all of people some of the time, but they can't fool all of the people all of the time.

1.2 resolución

1. $\exists$ s isStudent(s) $\rightarrow \exists$ c tookClases(s,c) : where c is french
2. $\forall$ s isStudent(s) $\wedge \exists$ c tookClases(s,c) $\rightarrow \exists$ c passClass(s,c) : where c is french
3. $\exists$ s isStudent(s) $\wedge \exists$ g tookClass(s, g) $\rightarrow \exists!$ study(s, g) : where s is student and g is Greek
4. $\forall$ c isCalificationOfGreek(g) $\wedge \forall$ f isCalificationOfFrench(f) $\rightarrow$ isHigher(g,f) : where the functions evaluates if param1 $\gg$ param2
5. $\exists$ p isPerson(p) $\wedge \exists$ l isPolicy(l) $\rightarrow \forall$ buys(p, l) $\rightarrow$ isWhise(p)
6. $\nexists$ p isPerson(p) $\wedge \exists$ l isPolicy(l) $\rightarrow$ buys(p, l)
7. $\exists$ p isPerson(p) $\wedge \exists$ a isAgent(a) $\wedge \exists$ l isPolicy(l) $\rightarrow$ buys(a, l) $\wedge$ buysTo(a,p)
8. $\exists$ p isPerson(p) $\wedge \exists$ b isBarber(b) $\wedge \exists$ t isTown(t) $\rightarrow$ dontShaveHimself(p) $\wedge$ isSaidTown(t) $\rightarrow$ shaves(b, p)
9. $\exists$ p1 isPerson(p1) $\wedge \exists$ p1 isPerson(p1) $\wedge \exists$ s isPerson(s) $\rightarrow$ bornInUK(p1) $\wedge$ bornInIJK(p2) $\wedge$ bornInUK(s) $\rightarrow$ haveUKNationality(s)

10. $\exists$ p1 isPerson(p1) $\land \exists$ p1 isPerson(p1) $\land \exists$ s isPerson(s) $\rightarrow$ bornInUK(p1) $\land$ bornInUK(p2) $\land$ notBornInUK(p1) $\rightarrow$ haveUKNationality(s)

11. $\exists$ Po isPolitician(po) $\land \exists$ Pe isPerson(pe) $\land \forall$ All isPerson(all) $\rightarrow$ (foolAllOfTheTime(po, pe) $\lor$ foolSomeOfTheTime(po, all)) $\land \neg$ foolAllOfTheTime(po, all)

2 ejercicio 8.7

2.1 enunciado

peresent the sentence " All Germans speak the same languages " in predicate calculus. Use Speaks (x, 1) , meaning that person x speaks language 1.

2.2 resolución

$\exists$ x isPerson(x) $\rightarrow$ isGerman(x) $\land$ speaks(x, 1)

3 ejercicio 8.8

3.1 enunciado

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

3.2 resolución

$\exists$ Laura $\land \exists$ Jim Spouse(Jim, Laura) $\rightarrow$ isFemale(Laura) $\land$ isMale(Jim)

4 ejercicio 8.9

4.1 enunciado

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

4.2 resolución

$\exists$ Napoleon $\land \exists$ Wellingtong $\rightarrow$ heardAbowtTheDeathOf(Wellington, Napoleon)
answer: yes

5 ejercicio 8.10

5.1 enunciado

Rewrite the propositional wumpus world facts from Section 7.5 into first - order logic. How much more compact is this version?

5.2 resolución

No he encontrado a que hace referencia

6 ejercicio 8.10

6.1 enunciado

Write axioms describing the predicates Grandchild, GreatGrandparent, Brother, Sister, Daughter, Son, Aunt, Uncle, BrotherInLaw, SisterInLaw, and First-cousin. Find out the proper definition of nzth cousin n times removed, and write the definition in first - order logic. Now write down the basic facts depicted in the family tree in Figure 8.5. Using a suit - able logical reasoning system, T E L L it all the sentences you have written down, and A S K it who are Elizabeth's grandchildren, Diana's brothers - in - law, and Zara's great - grandparents.

6.2 resolución

($\exists$ (George, Mum) $\wedge$ $\exists$ (Spencer, Kydd, Elizabeth, Philip, Margatet) $\wedge$ $\exists$ (Diana, Charles, Anne, Mark, Andrew, Sharah, Edward) $\wedge$ $\exists$ (William, Harry, Peter, Zara, Beatrice, Eugenie))
$\wedge$ $\forall$ (x, y, y') sonOf(x, y, y') $\rightarrow$ (isPerson(x) $\wedge$ isPerson(y) $\wedge$ isPerson(y') $\wedge$ isParent(y) $\wedge$ isParent(y')) $\wedge$ isSon(x))
$\rightarrow$
(isSon(Elizabeth, george, Mun) $\wedge$ isSon(Margatet, george, Mun))
$\wedge$ (isSon(Diana, Spencer, Kydd) $\wedge$ isSon(Charles, Elizabeth, Philip)
$\wedge$ isSon(Andrew, Elizabeth, Philip) $\wedge$ isSon(Edward, Elizabeth, Philip))
$\wedge$ (isSon(William, Diana, Charles) $\wedge$ isSon(Harry, Diana, Charles) $\wedge$ isSon(Peter, Annie, Mark) $\wedge$ isSon(Zara, Annie, Mark) $\wedge$ isSon(Beatrice, Beatrice, Eugenie)
$\wedge$ isSon(Eugenie, Beatrice, Eugenie))

7 ejercicio 8.11

7.1 enunciado

Write down a sentence asserting that + is a commutative function. Does your sentence follow from the Peano axioms? If so, explain why; if not, give a model in which the axioms are true and your sentence is false.

7.2 resolución

8 ejercicio 1

Obtén la forma normal clausulada de las siguientes fórmulas:

8.1 enunciado

1. $(p \land q) \lor (r \land s)$
2. $(p \land q) \rightarrow r$
3. $(p \land q) \oplus r$
4. $(\neg(p \land \neg q) \lor r] \rightarrow [(p \land \neg r) \lor q]$
5. $(p \land q) \rightarrow r] \iff [(p \land \neg r) \rightarrow \neg\, q]$

8.2 resolución

1. $(p \land q) \lor (r \land s)$
2. $\neg(p \land q) \lor r$
3. $((p \land q) \land r) \lor \neg(p \land q) \land \neg r$
4. $\neg[\neg(p \land \neg q) \lor r] \lor [(p \land \neg r) \lor q]$
5. $.[\neg[\neg(p \land q) \lor r] \lor [\neg(p \land \neg r) \lor \neg\, q] \,] \land [\, \neg\, [\neg(p \land \neg r) \lor \neg\, q] \lor [\neg(p \land q) \lor r] \,]$

9 ejercicio

9.1 enunciado

Representa los siguiente hechos con lógica de predicados:

1. Algunas plantas no tienen flores
2. Cualquier edificio es habitable
3. No hay delito sin causa
4. Algunas personas son insoportables
5. Existen personas que no comen carne
6. No es oro todo lo que reluce
7. Ningún asesino es bondadoso
8. El que estudia, aprueba
9. No todos los animales son racionales
10. Existen personas que aman a todo el mundo
11. No es verdad que todas las personas no amen a todo el mundo

9.2 resolución

1. ∃ Plant esPlanta(Plant) → haveNoFlower(Plant)
2. ∀ Edificio esEdificio(Edificio) → esHabitable(Edificio)
3. ∀ Delito esDelito(Delito) → conCausa(Delito)
4. ∃ Persona esPersona(Persona) → esInsoportable(Persona)
5. ∃ Persona esPersona(Persona) → ¬ comeCarne(Persona)
6. ∃ objeto esBrillante(objeto) → ¬ esOro(objeto)
7. ∀ Asesino Es persona(Asesino) ∧ Asesino(Asesino) → ¬ esBondadoso(Asesino)
8. ∀ Persona esPerosna() ∧ estudia(persona) → aprueba(Persona)
9. ∃ Animal esAnimal(Animal) → ¬ esRacional(Animal)
10. ∃ Persona sPersona(Perosna) ∧ ∀ Mundo esPersona(Mundo) → amar(Persona, Mundo)
11. ¬∀ Persona siPersona(Persona) ∧ ∀ Mundo esPersona(Mundo) → ¬ amar(Persona, Mundo)

Documento escrito en LaTeX