

INF2217 – Lista de Exercícios 1

Notação Utilizada: Utilizamos o símbolo “~” para negação, “&” para conjunção e “|” para disjunção.

Tradução

Traduza as seguintes sentenças em inglês para lógica proposicional. Utilize apenas as constantes lógicas fornecidas acima. Por exemplo, a sentença "It is either raining or snowing" utilizando as constantes lógicas ficaria:

raining = "It is raining"

snowing = "It is snowing"

e deve ser traduzida da seguinte forma:

raining | snowing

(a) "To become my girlfriend, you must be smart, pretty, and nice"

gf = "become my girlfriend"

s = "you are smart"

p = "you are pretty"

n = "you are nice"

(b) "Unless I go to Korea or Japan, I will not be able to attend a World Cup match"

k = "I go to Korea"

j = "I go to Japan"

w = "I will be able to attend a World Cup match"

(c) If the course is a breadth course then it may be waived only if a similar or more advanced course has been taken except if it was in another institution.

br = "the course is a breadth course"

wave = "the course may be waived"

similar = "a similar course has been taken"

advanced = "a more advanced course has been taken"

another = "it (the alternative course) was in another institution"

Tableaux

Give a formal proof of $(q \Rightarrow r) \Rightarrow ((p \Rightarrow \sim r) \Rightarrow \sim p)$ from the premises $(p \Rightarrow q)$ and $(q \Rightarrow r)$ using tableaux.

Propositional Resolution

In some of the examples below, propositional resolution has been applied incorrectly. In each case, respond YES if resolution is correct; otherwise respond NO and give all the correct resolvents of the premises (i.e. that are obtained by using the resolution rule). No explanation necessary.

1. $\{p, q, r\}$ Premise
2. $\{p, q, s\}$ Premise
3. $\{p, q, r, s\}$ 1,2

1. $\{\sim p, q, \sim r, s\}$ Premise
2. $\{p, \sim q, r, \sim t\}$ Premise
3. $\{s, \sim t\}$ 1,2

1. $\{q, \sim q\}$ Premise
2. $\{q, \sim q\}$ 1,1

Using propositional resolution, show a proof of $q \Rightarrow t$ from the premises:

- $(q \Rightarrow (p \ \& \ r))$
- $(\sim s \Rightarrow \sim p)$
- $((p \ \& \ s) \Rightarrow t)$

To do this, negate the goal, convert the sentences to clausal form, and derive the empty clause using resolution.

Prover9 / Mace4

Prover9 is an automated theorem prover for first-order and equational logic, and Mace4 searches for finite models and counterexamples.

Using Prover9, show a proof of $q \Rightarrow t$ from the premises:

- $(q \Rightarrow (p \ \& \ r))$
- $(\sim s \Rightarrow \sim p)$
- $((p \ \& \ s) \Rightarrow t)$