Homework 1/10 – Formalization in first-order logic

Alberto Becerra Tomé

February 19, 2024

Formalized Statements

1. It is not true that all long board games are strategic and interesting.
   $\neg\forall x(Lx \land Bx \rightarrow Sx \land Ix)$

2. All interesting board games have been designed by at least one Portuguese designer.
   $\forall x(Bx \land Ix \rightarrow \exists y(Dy \land Py \land Txy))$

3. There isn't any long board game designed at least by a French designer and a non-French designer.
   $\neg\exists x(Bx \land Lx \land \exists y(Fy \land Dy \land Txy) \land \exists z(\neg Fz \land Dz \land Txz))$

4. All board games designed by Vital Lacerda are long, strategic, and interesting.
   $\forall x(Bx \land Db \land Txb \rightarrow (Lx \land Sx \land Ix))$

5. Vital Lacerda is a Portuguese designer that only designs strategic board games.
   $Db \land \forall x(Txb \land Bx \rightarrow Sx)$

Natural Language Descriptions

1. $\neg\exists x(Bx \land Txb \land \neg Sx)$
   There's not a single board game containing Lacerda as one of its designers which isn't strategic.

2. $Ba \land Sa \land La \land Ia \land Tab$
   The Gallerist is a strategic, long, and interesting board game and has Vital Lacerda as one of its designers.

3. $\exists x(Dx \land Px \land \forall y(By \land Tyx \rightarrow Ly))$
   Some Portuguese designers only design long board games.

4. $\forall x(Dx \rightarrow \exists y(By \land \neg Iy \land Tyx))$
   All the designers have at least one non-interesting board game.

5. $\neg\forall x(Bx \land (Sx \lor Ix) \rightarrow Lx)$
   Not all the board games which are strategic or interesting are long.