Homework 3.5

Morgan Ciliv

February 2017

1 LOST in translation

For first-order logic, none of the variables are allowed to be free; therefore, each of these sentences must have quantifiers. If a variable was not quantified then there is no context for the existence of the variable in the universe, also known as domain of discourse. For example the trial sentence, $Fox(x)$ meaning that "x is a fox" is not defined in first-order logic because you are not actually stating anything about the universe unless quantified by "there exists an x such that" or "for all x such that." There is no truth-value that could be assigned to that trial sentence because it is not specific.

1.1 Everyone on flight 815 has a story

Defining the predicates:
$Flying(x)$ = x is on flight 815
$Story(x)$ = x has a story

$$\forall x \ (Flying(x) \rightarrow Story(x))$$

1.2 No one knows what is inside the hatch

Defining the predicates: $Knows(x)$ = x knows what is inside the hatch

$$\neg(\exists x \ Knows(x))$$

or, this is also equivalent to...

$$\forall x \ (\neg Knows(x)))$$

1.3 Someone on the island isn't on the flight manifest

Defining the predicates:
$Island(x)$ = x is on the island
$Manifest(x)$ = x is on the flight manifest

$$\exists x \ (Island(x) \wedge \neg Manifest(x))$$