CS 3600 - Introduction to Intelligent Systems

Homework 3 - Sample Solution

Write the following sentences in first-order logic using these literals: Has(Joe,x), Dog(x), Cat(x), Cute(x), Scary(x).

a) Joe has a cute dog.

∃x (Has(Joe,x) ^ Dog(x) ^ Cute(x))

b) All of Joe's dogs are cute.

∀x ((Has(Joe,x) ^ Dog(x)) => Cute(x))

c) Unless Joe has a dog, he is scary.

(~∃x (Has(Joe,x) ^ Dog(x))) => Scary(Joe)

d) Either Joe has at least one cat and at least one dog or he is scary (but not both at the same time).

∃x,y (Has(Joe,x) ^ Has(Joe,y) ^ Dog(x) ^ Cat(y)) <=> ~Scary(Joe)

e) Not all dogs are both scary and cute.

~∀x (Dog(x) => (Scary(x) ^ Cute(x)))