2003 Paper 9 Question 8

Artificial Intelligence II

(a) Explain what the terms *ontological commitment* and *epistemological commitment* mean in the context of a language for knowledge representation and reasoning. What are the ontological and epistemological commitments made by propositional logic and by first order logic? [4 marks]

(b) You wish to construct a robotic pet cat for the purposes of entertainment. One purpose of the cat is to scratch valuable objects when the owner is not present. Give a brief general description of *situation calculus* and describe how it might be used for knowledge representation by the robot. Include in your answer one example each of a *frame axiom*, an *effect axiom*, and a *successor-state axiom*, along with example definitions of suitable predicates and functions.
[12 marks]

(c) Give a brief description of the *representational frame problem*, the *inferential frame problem*, the *qualification problem*, and the *ramification problem*.
[4 marks]