

Logic and Artificial Intelligence Programming

Logic coursework 1

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Please submit electronically.

Answer all the questions.

Companies Registration House (CRH) keeps a record of registered companies and a register of disqualified directors. Formalise in predicate logic the sentences (i)-(v), below, that govern the activities of CRH. Use any of the predicates listed below and $<$, \leq , $=$ that you can use both for comparing dates and for comparing share values, and in the case of $=$ for comparing names as well.

Ensure that you present your formulas clearly, using brackets to correctly identify the scope of quantifiers and disambiguate where necessary.

<i>reg(C)</i>	to mean <i>C</i> is a registered company.
<i>dir(D, C)</i>	to mean <i>D</i> is the director of company <i>C</i> .
<i>reqReg(ID, C, D, S)</i>	to mean request <i>ID</i> is for registering a company by the name <i>C</i> , with director <i>D</i> and share capital <i>S</i> .
<i>reject(ID)</i>	to mean the request identified by <i>ID</i> for a company registration is rejected.
<i>accept(ID)</i>	to mean the request identified by <i>ID</i> for a company registration is accepted.
<i>disq(D)</i>	to mean <i>D</i> is disqualified.
<i>insolvent(C)</i>	to mean <i>C</i> is insolvent.
<i>share(C, Value)</i>	to mean the share capital of company <i>C</i> is set to <i>Value</i> .
<i>acc_due(C, P, D)</i>	to mean the accounts of company <i>C</i> for period <i>P</i> are due on date <i>D</i> .
<i>acc_filed(C, P, D)</i>	to mean the accounts of company <i>C</i> for period <i>P</i> are filed on date <i>D</i> .
<i>warn(D, C)</i>	to mean director <i>D</i> is warned about company <i>C</i> .

- i) Every registered company has exactly one director.
- ii) Any request for registering a company is rejected if a company of that name is already registered, or if the director is disqualified, or if the share capital of the company is less than £5000, otherwise the request is accepted.
- iii) A director is disqualified and the share capital of all of his registered companies is set to zero if at least one of his registered companies becomes insolvent.
- iv) The director of a registered company who is not disqualified is warned if on at least two occasions the company's accounts have not been filed by the due deadlines.
- v) If a director has been warned about one of his companies and the share capital of that company falls more than 80% below its initial capital (as noted in the request for the company's registration) then the director is disqualified. (Use the predicate *share(C, Value)* here to denote the share value of the company.)

The questions have equal marks.