

## Logic and Artificial Intelligence Programming

### Logic coursework 1

Lecturer : F. Sadri

Date set : 24 October 2017

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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.

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

- 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.*

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