Answers to Logic Coursework 1 Oct/Nov 2017

i) Every registered company has exactly one director.

$\forall X\ (reg(X) \rightarrow$
$\exists D\ dir(D, X) \wedge \forall D1, D2\ (dir(D1, X) \wedge dir(D2, X) \rightarrow D1=D2)$

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.

$\forall ID, X, D, S\ (reqReg(ID, X, D, S) \rightarrow$
$[(\ reg(X) \vee disq(D) \vee S<5000 \rightarrow reject(ID)\ ) \wedge$
$(\ \neg reg(X) \wedge \neg\ disq(D) \wedge \neg\ S<5000 \rightarrow accept(ID))]$

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.

$\forall D\ (\exists X\ (reg(X) \wedge dir(D, X) \wedge insolvent(X)) \rightarrow$
$[disq(D) \wedge \forall X\ (reg(X) \wedge dir(D, X) \rightarrow share(X, 0))]$

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.

$\forall X,D\ (reg(X) \wedge dir(D, X) \wedge \neg\ disq(D) \wedge$
$\exists D1, D2\ (\ acc\_due(X, P1, D1) \wedge acc\_due(X, P2, D2) \wedge \neg\ D1=D2 \wedge \neg\ P1=P2 \wedge$
$\neg\ \exists F1\ (\ acc\_filed(X, P1, F1) \wedge F1 \leq D1) \wedge$
$\neg\ \exists F2\ (\ acc\_filed(X, P2, F2) \wedge F2 \leq D2)$
$\rightarrow warn(D, X)$

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.

$\forall C,D, ID, S1, S2$
$[warn(D, C) \wedge share(C, S1) \wedge reqReg(ID, C, D, S2) \wedge S1 < S2* 20\% \rightarrow disq(D)]$

*The questions have equal marks.*

Total 100.