

# First-Order Logic for-kl-1

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## 1 fol-kr-1

1.  $\forall x \text{ Human}(x) \rightarrow \text{Student}(x)$
2.  $\exists x \text{ Book}(x) \rightarrow \text{Useful}(x)$
3.  $\neg \forall x (\text{Book}(x) \rightarrow \text{Useful}(x))$
4.  $\neg \forall x (\text{Dog}(x) \rightarrow \text{Student}(x))$
5.  $\forall x \text{ Dog}(x) \rightarrow \forall y \text{ Has}(x, y)$
6.  $\exists x \text{ Human}(x) \rightarrow \forall y \text{ Likes}(x, y)$
7.  $\forall x (\text{Coworker}(x, y) \leftrightarrow \forall y (\text{Human}(x) \wedge \text{Human}(y) \wedge \exists z (\text{Human}(z) \wedge \text{Boss}(x, z) \wedge \text{Boss}(y, z))))$
8.  $\text{Equal}(\text{Tony Stark}, \text{Iron Man})$
9.  $\exists x \forall y \text{ Human}(x) \rightarrow \text{Like}(x, y) \leftrightarrow \text{Has}(x, y)$
10.  $\exists x (\text{Book}(x) \wedge \text{Useful}(x)) \wedge \forall y ((\text{Book}(y) \wedge \neg \text{Equal}(x, y)) \rightarrow \neg \text{Useful}(y))$
11.  $\exists x \text{ Dog}(x) \rightarrow \text{Like}(x, \text{Tony Stark})$
12.  $\forall w \text{ Dog}(w) \wedge \forall x (\text{Dog}(x) \wedge \neg \text{Equal}(w, x) \wedge \text{GT}(w, x)) \wedge \forall y \text{ Human}(y) \wedge \forall z ((\text{Human}(z) \wedge \neg \text{Equal}(y, z) \wedge \text{GT}(y, z)) \rightarrow \text{GT}(w, z))$
13.  $\forall x \text{ Dog}(x) \wedge \text{Useful}(x)$
14.  $\exists x \text{ Human}(x) \rightarrow \text{Student}(x)$
15.  $\neg \forall x (\text{Human}(x) \rightarrow \text{Student}(x))$
16.  $\neg \forall x (\text{Book}(x) \rightarrow \text{Useful}(x))$
17.  $\forall x (\text{Student}(x) \wedge \text{Book}(y)) \rightarrow \exists y \text{ Has}(x, y)$
18.  $\exists x (\text{Human}(x) \wedge \text{Book}(y)) \rightarrow \forall y \text{ Has}(x, y)$
19.  $\exists x \text{ Human}(x) \wedge \exists y (\text{Book}(y) \wedge \text{Has}(x, y) \wedge \text{Book}(z) \wedge \neg \text{Equal}(y, z)) \rightarrow \forall z \text{ Like}(x, y)$
20.  $\exists x \text{ Student}(x) \wedge \exists y (\text{Dog}(y) \wedge (\text{Dog}(z) \wedge \neg \text{Equal}(y, z))) \rightarrow \forall z \text{ Has}(x, y)$