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- 1. $(\forall x)(\forall y)(\texttt{has-forgiven}(x,y) \rightarrow \texttt{is-a-saint}(x))$
- 2. $(\forall x)$ (is-in-the-logic-class $(x) \rightarrow (\exists y)$ (is-in-the-history-class $(y) \land \neg (\text{is-cleverer-than}(x,y));$
- 3. $\neg L(m,m) \land (\forall x)(x \neq m \rightarrow L(x,m))$
- 4. $(\exists x)(B(x) \land S(j,x)) \land (\exists x)(B(x) \land S(r,x));$
- 5. $(\exists x)(B(x) \land S(j,x) \land S(r,x));$
- 6. $(\forall x)(L(x,m)) \wedge (\forall x)(L(b.x) \rightarrow x = m);$

And now the examples from Lewis Carroll:

- 1. $Man(Socrates); (\forall x)(Man(x) \rightarrow Mortal(x)).$ Therefore Mortal(Socrates).
- 2. $\texttt{Cow}(\texttt{Daisy}); (\forall x)(\texttt{Cow}(x) \to \texttt{eats-grass}(x)).$ Therefore eats-grass(Daisy). $\texttt{Cow}(\texttt{Daisy}); (\forall x)(\texttt{Cow}(x) \to \texttt{Mad}(x)).$ Therefore mad(Daisy).
- 3. $(\forall x)(\mathtt{thief}(x) \to \neg(\mathtt{honest}(x)); (\exists x)(\neg(\mathtt{honest}(x) \land \mathtt{found-out}(x)).$ Therefore $(\exists x)(\mathtt{thief}(x) \land \mathtt{found-out}(x))$
- 4. $\neg(\exists x)(\mathtt{muffin}(x) \land \mathtt{wholesome}(x)); (\forall x)(\mathtt{Puffy}(x) \rightarrow \neg(\mathtt{wholesome}(x)).$ Therefore $(\forall x)(\mathtt{Muffin}(x) \rightarrow \mathtt{puffy}(x))$
- $5. \ (\forall x) (\texttt{proud-of-tail}(x) \rightarrow \texttt{peacock}(x)); \ (\exists x) (\texttt{proud-of-tail}(x) \land \neg (\texttt{can-sing}(x))); \ (\exists x) (\texttt{peacock}(x) \land \neg \texttt{can-sing}(x))).$
- 6. Relieves(Warmth, Pain); $(\forall x)$ (useful-in-toothache(x) \rightarrow relieves(x, pain). Therefore Useful-in-toothache(warmth)
- 7. $(\forall x)(\mathtt{wise}(x) \to \mathtt{walks-on-feet}(x)); (\forall x)(\neg(\mathtt{wise}(x)) \to \mathtt{walks-on-hands}(x)); (\forall x)(\neg(\mathtt{walks-on-feet}(x) \land \mathtt{walks-on-hands}(x)))$

You might want to try to capture that fact that walks-on-feet and walks-on-hands share some structure, and have a two-place relation walks-on. Then i think you will also want feet-of and hands-of, so you would end up with

$$(\forall x)(\mathtt{wise}(x) \to (\forall y)(\mathtt{feet-of}(x,y) \to \mathtt{walks-on}(x,y)))$$
 and of course

$$(\forall x)(\neg \mathtt{wise}(x) \to (\forall y)(\mathtt{hands-of}(x,y) \to \mathtt{walks-on}(x,y)))$$

You might feel that the following are equally good formalisations:

$$(\forall x)(\mathtt{wise}(x) \to (\exists y)(\exists z)(\mathtt{feet-of}(x,y) \land \mathtt{feet-of}(x,z) \land \neg(y=z) \land \mathtt{walks-on}(x,y) \land \mathtt{walks-on}(x,z)))$$
 ... and the same for unwise men and hands.

- 8. $(\forall x)(\texttt{fossil}(x) \to \neg \texttt{can-be-crossed-in-love}(x)); (\forall x)(\texttt{oyster}(x) \to \texttt{can-be-crossed-in-love}(x)); therefore <math>(\forall x)(\texttt{oyster}(x) \to \neg \texttt{fossil}(x))$
- 9. $(\forall x)(\texttt{anxious-to-learn}(x) \to \texttt{works-hard}(x)); (\exists x)(\texttt{student}(x) \land \texttt{works-hard}(x));$ therefore $(\exists x)(\texttt{student}(x) \land \texttt{anxious-to-learn}(x))$
- 10. $(\forall y)(\operatorname{song}(y) \to \operatorname{his}(x) \to \operatorname{last-an-hour}(y)); (\forall x)(\operatorname{song}(x) \wedge \operatorname{last-an-hour}(x) \to \operatorname{tedious}(x)); \text{ therefore } (\forall z)(\operatorname{song}(z) \wedge \operatorname{his}(z) \to \neg \operatorname{tedious}(z)).$
- 11. $(\exists x)(\mathtt{lesson}(x) \land \mathtt{tedious}(x)); (\forall z)(\mathtt{difficult}(z) \rightarrow \mathtt{merits-attention}(z)).$ therefore $(\exists x)(\mathtt{lesson}(x) \land \mathtt{merits-attention}(x)).$
- 12. $(\forall y)(\operatorname{human}(y) \to \operatorname{mammal}(y)); (\forall y)(\operatorname{mammal}(y) \to \operatorname{warmblooded}(y)).$ Therefore $(\forall z)(\operatorname{human}(z) \to \operatorname{warmblooded}(z))).$