Exercise 48 Identify all predicate symbols and all terms in Example 3.1.5 3.

Exercise 49 Determine all predicate symbols and all function symbols, with arities, of the formula

$$\forall\varepsilon\exists\delta\forall x((\varepsilon > 0 \wedge \delta > 0) \to (|x - 2| < \delta \to |x^3 - 2^3| < \varepsilon)).$$

Exercise 50 Give all subformulas of Example 3.1.5 4. Which of them are closed? Which of them are open?

Exercise 51 Give a structure for the formula

$$\forall x\forall y(Q(x, y) \to Q(y, x)).$$

Exercise 52 Give two structures for the first formula in Example 3.2.8, one of which is a model for the formula, and one of which is not a model for the formula.

Exercise 53 Show that $(U_\mathcal{B}, I_\mathcal{B})$ as in Example 3.2.2 is a model for

$$\forall x\exists y(P(x) \wedge Q(s(x), y)).$$

Exercise 54 Sentence 1 of Example 3.1.2 can be written as.

$$\forall x(\mathrm{Healthy}(x) \to \neg\mathrm{Dead}(x)).$$

Translate all other sentences from Example 3.1.2. Use schroedinger as a constant symbol and use only the following predicate symbols:
unary: Healthy, Dead, Cat, Alive, HappyCatOwner
binary: owns, cares

Exercise 55 Sketch how you could formally prove, using the formulas from Exercise 54, that Schrödinger's cat is alive.