Tik-79.144 **Syksy 1999**
Logic in Computer Science: Foundations
Exercise 8

1. Transform the following sentences to clausul form.

a) $\neg\exists x((P(x) \to P(a)) \wedge (P(x) \to P(b)))$,

b) $\forall y \exists x P(x, y)$,

c) $\neg\forall y \exists x G(x, y)$

d) $\exists x \forall y \exists z (P(x, z) \vee P(z, y) \to G(x, y))$.

2. Find the Herbrand universumes and Herbrand bases of the following sentences:

a) $\{\{\neg G(x, c)\}\}$,

b) $\{\{P(f(y), y)\}\}$,

c) $\{\{P(x)\},\ \{\neg P(a),\ \neg P(b)\}\}$,

d) $\{\{\neg P(x, y),\ \neg P(y, z),\ G(x, z)\}\}$,

e) $\{\{\neg P(x, y)\},\ \{Q(a, x),\ Q(b, f(y))\}\}$

f) $\{\{P(x),\ Q(f(x, y))\}\}$

3. Transform the set of statements

$$\{\forall x P(x, a, x),\ \neg\exists x \exists y \exists z (P(x, y, z) \wedge \neg P(x, f(y), f(z)))\}$$

into clausul form. Find a Herbrand model of the set of clauses.