Exercises

Derive the logic programming representation of each of the following sets of propositional formulas P:

Exercise 1. $P = \{(p \vee \neg q) \leftrightarrow (s \rightarrow (\neg q \vee t))\}$

Exercise 2. $P = \{(s \wedge \neg q), q \vee \neg r, (s \leftrightarrow (\neg q \vee t))\}$

Exercise 3. Prove that every propositional formula f has an equivalent formula in CNF. To do this, you will need to do a structural induction on the definition of propositional formula, which goes like this:

> *base case:* $f = p$ or $f = \neg p$ for some variable p. Prove for the base case ...
>
> *inducitive step:* assume proved for formulas f_1, f_2. Now prove for $f_1 \wedge f_2$, $f_1 \vee f_2$, $\neg f_1$.

Solutions are on the next page

Solutions

Exercise 1

$$
\begin{aligned}
t &:- p, s, q \\
s, p &:- q \\
p &:- t, q
\end{aligned}
$$

Exercise 2

$$
\begin{aligned}
s &:- \\
&:- q \\
q &:- r \\
t &:- s, q \\
q, s &:- \\
s &:- t
\end{aligned}
$$

Exercise 3

If you think you have a proof, either email it to me, or come by my office to show it to me.