580-2009-12-08

Note Title 12/8/2009

(a) Every barber shaves all persons who do not shave themselves.

(b) No barber shaves any person who shaves himself.

(g) There are no barbers.

(a) $\forall x \forall y\ (\neg Shaves(x,x) \wedge IsBarber(y)) \Rightarrow Shaves(y,x))$

$\forall x \forall y\ (Shaves(x,x) \vee \neg IsBarber(y) \vee Shaves(y,x))$

(a) $\{Shaves(x,x), \neg IsBarber(y), Shaves(y,x)\}$

(b) $\forall x\ (Shaves(x,x) \Rightarrow \neg \exists y\ (IsBarber(y) \wedge Shaves(y,x)))$

$\forall x(\neg Shaves(x,x) \lor \neg \exists y(IsBarber(y) \land Shaves(y,x)))$

$\forall x(\neg Shaves(x,x) \lor \forall y \neg (IsBarber(y) \land Shaves(y,x)))$

$\forall x(\neg Shaves(x,x) \lor \forall y(\neg IsBarber(y) \lor \neg Shaves(y,x)))$

(b) $\{\neg Shaves(x,x),\ \neg IsBarber(y),\ \neg Shaves(y,x)\}$

(g) $\neg \exists x\, IsBarber(x)$

(~g) $\neg\neg \exists x\, IsBarber(x)$ $\qquad \exists x\, IsBarber(x)$

(~g) $\{IsBarber(A)\}$

(a) $\qquad\qquad$ (~g) $\qquad\qquad$ (b)

$\{z/A\}$ $\qquad\qquad\qquad\qquad\qquad\qquad$ $\{y/A\}$

$\{Shaves(z,z),\ Shaves(A,z)\}$ $\qquad$ $\{\neg Shaves(x,x),\ \neg Shaves(A,x)\}$

factor | factor |

$\{Shaves(A,A)\}$ $\{\neg Shaves(A,A)\}$

$\square$

Instead of factoring, one could do non-binary resolution

12.

```
% Exercise 6.15 [P]

% remove\3
% Requires the second list to be nonempty
% rem( X, [], []).
rem( X, [X|Xs], Xs).
rem( X, [Y|Xs], [Y|Ys]) <-
   rem( X, Xs, Ys).

subseq( [X|Xs], [X|Ys]) <-
   subseq( Xs, Ys).
subseq( Xs, [_|Ys]) <-
   subseq( Xs, Ys).
```

We reviewed this code

We reviewed a solution to Ex. 12.16 (a).
We reviewed the first part of the
Fall 2008 review session on decomposition
of binary relations.