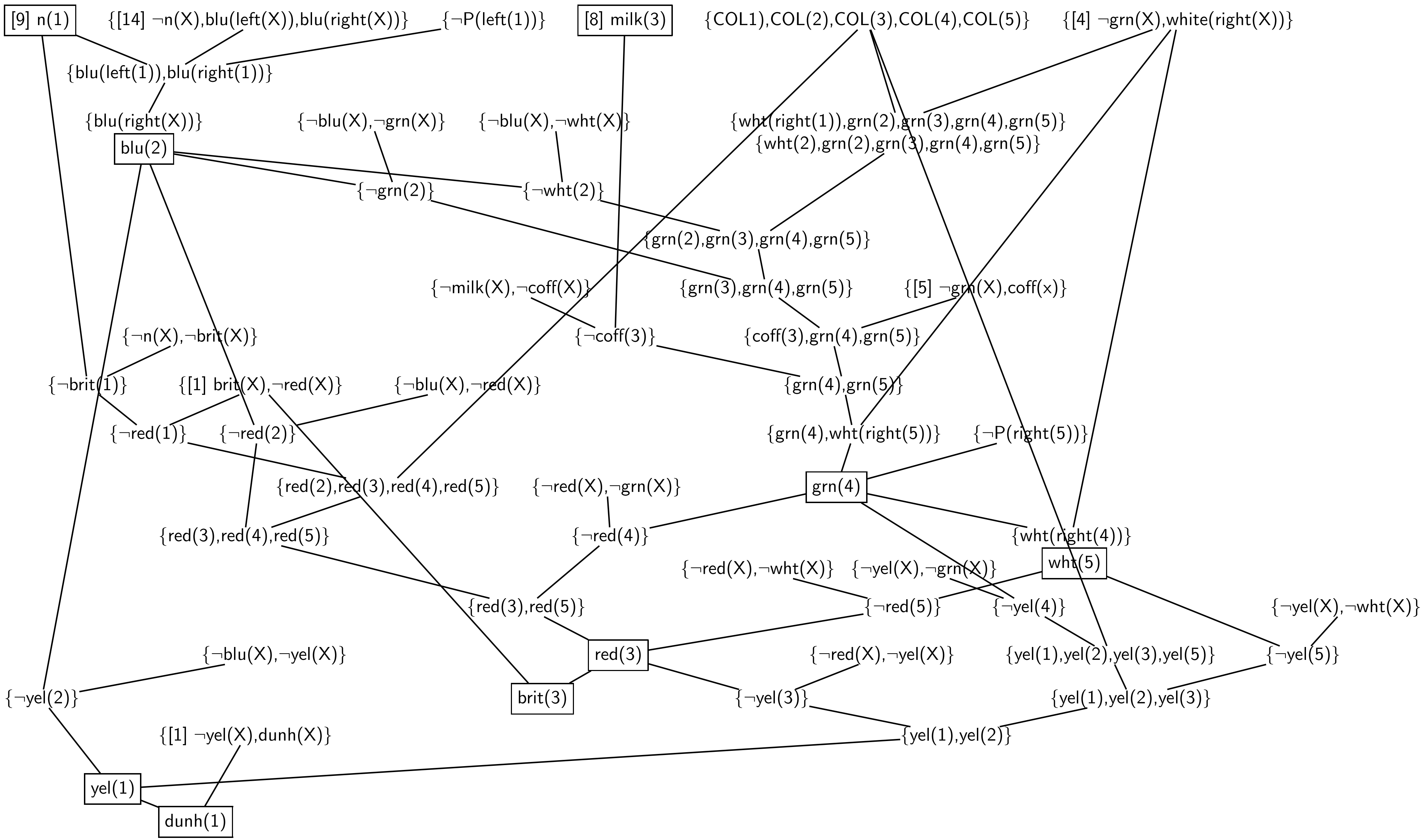
Fishpuzzle Resolution Proof

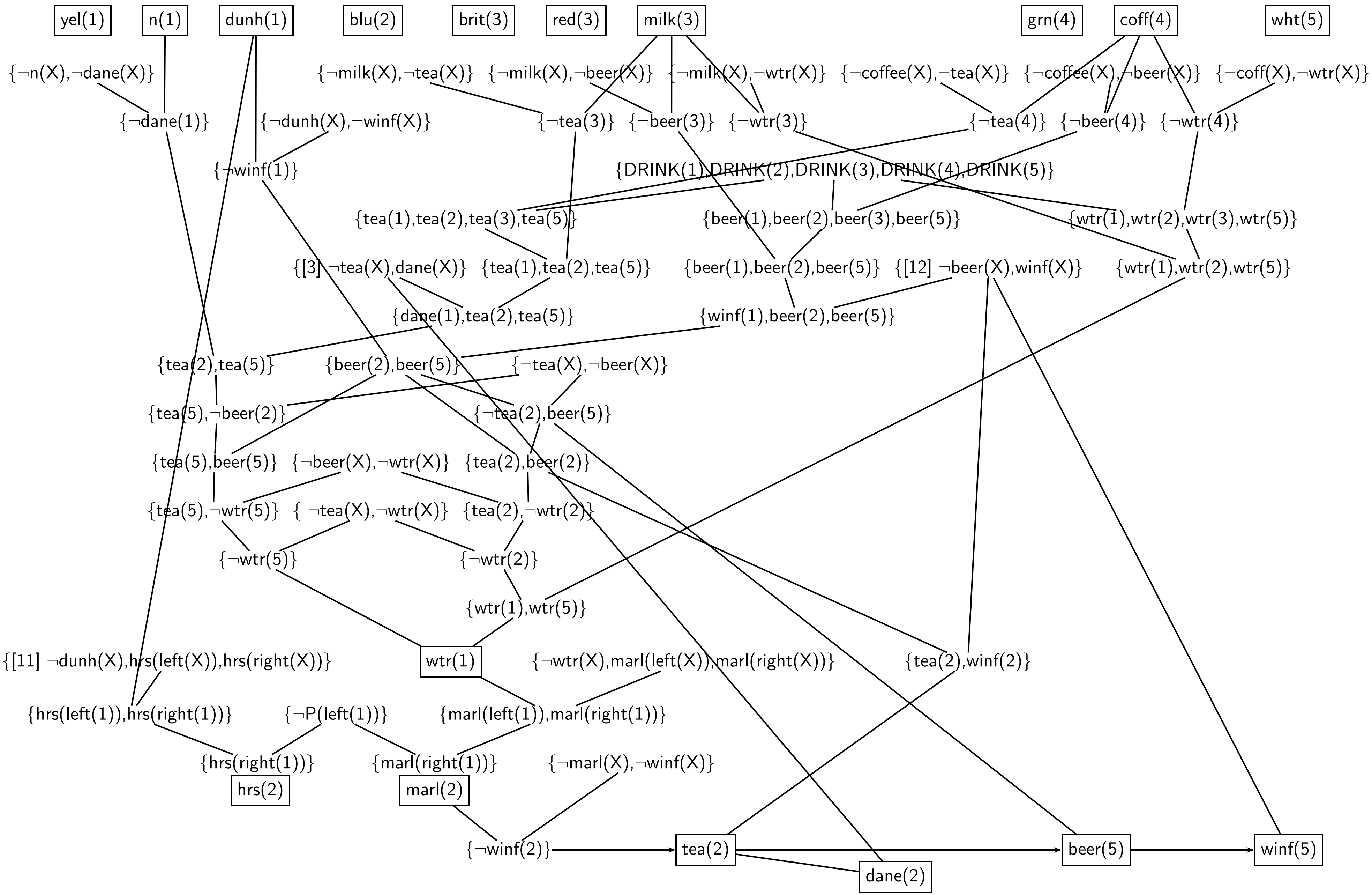
The proof makes use of some shortcuts by Hilog-like predicate variables:

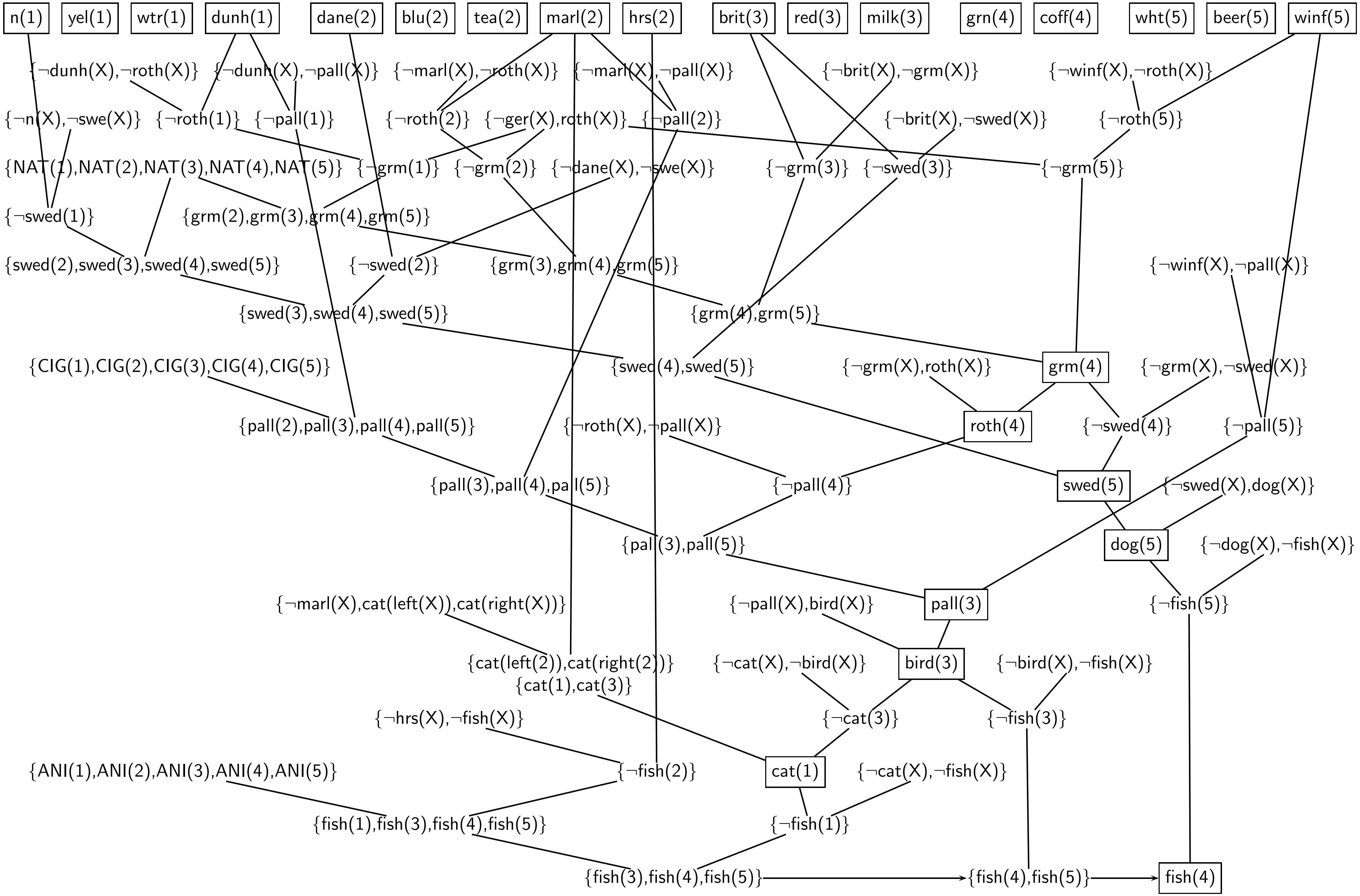
- predicate variable atoms "COLOR(X)" can be unified with any atom like "red(1)".
- "P(*term*)" can be unified with any atom like "red(*term*)".
  Especially, the unary clause {¬P(left(1))} is used to express that no unary predicate holds for left(1) (since left(1) does not exist).

  With this shortcut, e.g., "the Norwegian lives next to the blue house" can be expressed in general by {¬n(X),blu(left(X)),blu(right(X))}, and {n(1)} ("the Norwegian lives in the first house) resolves to {blu(left(1)),blu(right(1))}, which then can immediately resolved to {blu(right(1))}, which can be simplified to {blu(right(2))}

  Otherwise, clauses like $\{\neg \mathsf{blueneighbor}(X), \mathsf{blueleftneighbor}(X), \mathsf{bluerightneighbor}(X)\}$ and either $\mathsf{blueleftneighbor}(X) \rightarrow (\exists Y : \mathsf{left}(X,Y) \wedge \mathsf{blue}(Y))$ or $\mathsf{blueleftneighbor}(X) \rightarrow (\forall Y : \mathsf{left}(X,Y) \wedge \mathsf{blue}(Y))$ together with $\neg\exists Y : Y = \mathsf{left}(1,Y)$ and handling equality would be needed.


[9] n(1)
{[14] ¬n(X),blu(left(X)),blu(right(X))}
{¬P(left(1))}
[8] milk(3)
{COL1),COL(2),COL(3),COL(4),COL(5)}
{[4] ¬grn(X),white(right(X))}
{blu(left(1)),blu(right(1))}
{blu(right(X))}
{¬blu(X),¬grn(X)}
{¬blu(X),¬wht(X)}
{wht(right(1)),grn(2),grn(3),grn(4),grn(5)}
blu(2)
{wht(2),grn(2),grn(3),grn(4),grn(5)}
{¬grn(2)}
{¬wht(2)}
{grn(2),grn(3),grn(4),grn(5)}
{¬milk(X),¬coff(X)}
{grn(3),grn(4),grn(5)}
{[5] ¬grn(X),coff(x)}
{¬n(X),¬brit(X)}
{¬coff(3)}
{coff(3),grn(4),grn(5)}
{¬brit(1)}
{[1] brit(X),¬red(X)}
{¬blu(X),¬red(X)}
{grn(4),grn(5)}
{¬red(1)}
{¬red(2)}
{grn(4),wht(right(5))}
{¬P(right(5))}
{red(2),red(3),red(4),red(5)}
{¬red(X),¬grn(X)}
grn(4)
{red(3),red(4),red(5)}
{¬red(4)}
{wht(right(4))}
wht(5)
{¬red(X),¬wht(X)}
{¬yel(X),¬grn(X)}
{red(3),red(5)}
{¬red(5)}
{¬yel(4)}
{¬yel(X),¬wht(X)}
{¬blu(X),¬yel(X)}
red(3)
{¬red(X),¬yel(X)}
{yel(1),yel(2),yel(3),yel(5)}
{¬yel(5)}
{¬yel(2)}
brit(3)
{¬yel(3)}
{yel(1),yel(2),yel(3)}
{[1] ¬yel(X),dunh(X)}
{yel(1),yel(2)}
yel(1)
dunh(1)


yel(1)
n(1)
dunh(1)
blu(2)
brit(3)
red(3)
milk(3)
grn(4)
coff(4)
wht(5)
{¬n(X),¬dane(X)}
{¬milk(X),¬tea(X)}
{¬milk(X),¬beer(X)}
{¬milk(X),¬wtr(X)}
{¬coffee(X),¬tea(X)}
{¬coffee(X),¬beer(X)}
{¬coff(X),¬wtr(X)}
{¬dane(1)}
{¬dunh(X),¬winf(X)}
{¬tea(3)}
{¬beer(3)}
{¬wtr(3)}
{¬tea(4)}
{¬beer(4)}
{¬wtr(4)}
{¬winf(1)}
{DRINK(1),DRINK(2),DRINK(3),DRINK(4),DRINK(5)}
{tea(1),tea(2),tea(3),tea(5)}
{beer(1),beer(2),beer(3),beer(5)}
{wtr(1),wtr(2),wtr(3),wtr(5)}
{[3] ¬tea(X),dane(X)}
{tea(1),tea(2),tea(5)}
{beer(1),beer(2),beer(5)}
{[12] ¬beer(X),winf(X)}
{wtr(1),wtr(2),wtr(5)}
{dane(1),tea(2),tea(5)}
{winf(1),beer(2),beer(5)}
{tea(2),tea(5)}
{beer(2),beer(5)}
{¬tea(X),¬beer(X)}
{tea(5),¬beer(2)}
{¬tea(2),beer(5)}
{tea(5),beer(5)}
{¬beer(X),¬wtr(X)}
{tea(2),beer(2)}
{tea(5),¬wtr(5)}
{ ¬tea(X),¬wtr(X)}
{tea(2),¬wtr(2)}
{¬wtr(5)}
{¬wtr(2)}
{wtr(1),wtr(5)}
{[11] ¬dunh(X),hrs(left(X)),hrs(right(X))}
wtr(1)
{¬wtr(X),marl(left(X)),marl(right(X))}
{tea(2),winf(2)}
{hrs(left(1)),hrs(right(1))}
{¬P(left(1))}
{marl(left(1)),marl(right(1))}
{hrs(right(1))}
{marl(right(1))}
{¬marl(X),¬winf(X)}
hrs(2)
marl(2)
{¬winf(2)}
tea(2)
beer(5)
winf(5)
dane(2)


n(1)
yel(1)
wtr(1)
dunh(1)
dane(2)
blu(2)
tea(2)
marl(2)
hrs(2)
brit(3)
red(3)
milk(3)
grn(4)
coff(4)
wht(5)
beer(5)
winf(5)
{¬dunh(X),¬roth(X)}
{¬dunh(X),¬pall(X)}
{¬marl(X),¬roth(X)}
{¬marl(X),¬pall(X)}
{¬brit(X),¬grm(X)}
{¬winf(X),¬roth(X)}
{¬n(X),¬swe(X)}
{¬roth(1)}
{¬pall(1)}
{¬roth(2)}
{¬ger(X),roth(X)}
{¬pall(2)}
{¬brit(X),¬swed(X)}
{¬roth(5)}
{NAT(1),NAT(2),NAT(3),NAT(4),NAT(5)}
{¬grm(1)}
{¬grm(2)}
{¬dane(X),¬swe(X)}
{¬grm(3)}
{¬swed(3)}
{¬grm(5)}
{¬swed(1)}
{grm(2),grm(3),grm(4),grm(5)}
{swed(2),swed(3),swed(4),swed(5)}
{¬swed(2)}
{grm(3),grm(4),grm(5)}
{¬winf(X),¬pall(X)}
{swed(3),swed(4),swed(5)}
{grm(4),grm(5)}
{CIG(1),CIG(2),CIG(3),CIG(4),CIG(5)}
{swed(4),swed(5)}
{¬grm(X),roth(X)}
grm(4)
{¬grm(X),¬swed(X)}
{pall(2),pall(3),pall(4),pall(5)}
{¬roth(X),¬pall(X)}
roth(4)
{¬swed(4)}
{¬pall(5)}
{pall(3),pall(4),pall(5)}
{¬pall(4)}
swed(5)
{¬swed(X),dog(X)}
{pall(3),pall(5)}
dog(5)
{¬dog(X),¬fish(X)}
{¬marl(X),cat(left(X)),cat(right(X))}
{¬pall(X),bird(X)}
pall(3)
{¬fish(5)}
{cat(left(2)),cat(right(2))}
{cat(1),cat(3)}
{¬cat(X),¬bird(X)}
bird(3)
{¬bird(X),¬fish(X)}
{¬hrs(X),¬fish(X)}
{¬cat(3)}
{¬fish(3)}
{ANI(1),ANI(2),ANI(3),ANI(4),ANI(5)}
{¬fish(2)}
cat(1)
{¬cat(X),¬fish(X)}
{fish(1),fish(3),fish(4),fish(5)}
{¬fish(1)}
{fish(3),fish(4),fish(5)}
{fish(4),fish(5)}
fish(4)