Matching terms are called Unification

**Algorithm (Unification)**

Unify(x, y, θ)
- x – a variable, constant, term or list
- y – a variable, constant, term, or list
- θ – a substitution so far

if(θ == fail)
    return fail

if (x(θ) == y(θ))
    return θ

else if ( var? (x))
    return unify-var(x, y, θ)

else if ( var? (y))
    return unify-var(x, y, θ)

else if ( term? (x) and term? (y))
    return (unify(args (x), args(y), unify( op(x), op(y), θ))

else if (list? (x) and list? (y))
    return (unify(cdr x, cdr y, unify(car x, car y, θ)))

else
    return fail

unify-var(var, y, θ)
- var – a variable
- y – an expression
- θ – a substitution

if(var |-> val) exists in θ
    return unify(val, x, θ)

else if (x |-> val) exists in θ
    return unify(var, val, θ)

else if (occur-ck? (var, x))
    return fail;

else
    return (cons (var |-> x) θ)

Example

num(0)
num(s(x)) :- num(x)
1?- num(s (s (x)))
(retuns fail)

Example

x’ = g(h(x, y), z)
y’ = g(w, t(v))

Initially, θ is ( )
Since x’ and y’ are both terms, we return unify ((h(x, y) z), (w t(v))), unify(g(a, b), g(a, b)))
notice that a, b are new variable names
the second unify will return θ = ( ) since g(a, b) are the same thing
So now we try to unify two lists (h(x, y) z), (w t(v)))
So we will do unify( (z) (t(v)) unify (unify (h(x, y), w, θ)) θ is still ( )
now we call unify-var (w, h(x,y), θ)
this statement will return (w |-> h(x, y))
We now need to unify (z) & (t(v)) with respected substitution (w |-> h(x,y'))
When we get the final recursive answer, we will have
   ( (z |-> t(v)) (w |-> h(x,y)) )

PROLOG

Prolog prompt looks like
l?- 

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