Homework 1

1. Consider the following terms with variables X, Y, Z

A := f(X, Y)
B := f(h(X), g(b, h(X)))
C := f(h(g(X, Y)), g(Y, Z))
D := f(g(X), h(Y))
E := f(h(g(a, b)), g(b, h(c)))

a) Solve equations
A = E, B = E, C = E, D = E.
Provide the solutions as substitutions (the most general unifiers).
b) Solve equations
A = f(h(U), U), B = f(h(U), U), C = f(h(U), U), D = f(h(U), U), E = f(h(U), U)
where U is a variable.
Provide the solutions as substitutions (the most general unifiers).
c) Solve equations
A = f(U, g(V, U)), B = f(U, g(V, U)), C = f(U, g(V, U)), D = f(U, g(V, U)),
E = f(U, g(V, U)),
where U and V are variables. Provide the solutions as substitutions (the most general unifiers).

2. Consider the relation
r(., .) = {[a, b], [f(a), g(b)], [f(g(a)), g(f(b))], [f(f(a)), f(a)]}.
Compute relations:
a) atov(r(f(X), g(Y)), r)
b) atov(r(f(X), X), r)
c) vtoa(r(f(X, Y), g(X)), r(X,Y))