Exercise 7.1 (3.29):
Compute an mgu for the following unification problems using both $\Rightarrow_{SU}$ and $\Rightarrow_{PU}$ where $x$, $y$, $z$ and their primed versions are all variables:

1. $\{ f(x, h(x, y)) = f(f(y, z), h(y, z')) \}$
2. $\{ h(x, y) = z, g(f(x, x)) = z', g(f(a, y)) = g(z') \}$
3. $\{ h(x, y) = h(x', y'), y' = f(x, a), f(g(a), z) = y \}$

Exercise 7.2 (3.31):
Compute a most general unifier of $P(h(x_1), x_4, g(x_2, f(x_2)))$ and $P(h(x_4), g(f(x_3), x_5), x_1)$.

Exercise 7.3 (3.30):
Check whether the below unification problems have a solution using $\Rightarrow_{PU}$ where $x$, $y$, $z$, possibly indexed, are variables. If a unifier exists, present it.

1. $\{ f(g(x, y), z) = z_1, z_1 = x_1, x_1 = f(y_1, h(z_1, a)) \}$
2. $\{ f(g(x, y), z) = z_1, z_1 = f(y_1, h(x_2, a)), x_2 = g(a, b) \}$
3. $\{ f(z, g(x, y)) = f(x_1, x_1), x = h(y_1, y_1), y = h(z_1, z_1) \}$
4. $\{ f(g(a, y), z) = z_1, z_1 = x_1, x_1 = f(g(y_1, a), z_2), g(y_1, a) = g(b, x_2) \}$
5. $\{ f(z, g(x, y)) = f(x_1, x_1), x = h(y_1, y_1), y = h(x_2, z) \}$

Exercise* 7.4 (3.35):
Prove: if $\sigma_1$, $\sigma_2$ are two mgus for two terms $s$, $t$, then they are identical up to variable renaming.

It is not encouraged to prepare joint solutions, because we do not support joint exams.