

Assignment 10

due Wednesday, November 30

These problems rely on the latest version of the github lamr repository, so be sure to use a new Gitpod image or update your repository following the instructions in the README.

Problem 1 (7 points)

Build the Tarski's World models that meet the specifications in `assignment10a.lean`.

Problem 2 (3 points)

In this problem, x , y , z , and w denote variables. For each pair of expressions, present an assignment that unifies them, or explain why no such assignment exists.

1. $R(f(x), g(x))$ and $R(f(f(a)), g(f(y)))$
2. $f(x, h(x), y)$ and $f(g(z), w, z)$
3. $f(x, g(h(z)), y)$ and $f(g(y), x, z)$

Problem 3 (7 points)

Replace the definitions of of the functions `sortGtConstraints` and `elimVarGtConstraints` in the file `assignment10b.lean` to meet the specifications indicated in that file.

Problem 4 (3 points)

Present an equational proof of $f(a) = a$ from $f^5(a) = a$ and $f^8(a) = a$, where $f^n(a)$ abbreviates n -fold application $f(f(\dots f(a)))$. At each line indicate whether you are applying congruence to a previous line or some combination of symmetry and transitivity. You can chain together as many instances of symmetry and transitivity as you like; just indicate which lines you are using. For example, your proof might begin like this:

1. $f^5(a) = a$, given
2. $f^8(a) = a$, given
3. $f^6(a) = f(a)$, congruence 1
4. ...