

Assignment 1

Due Sunday, April 17, 2011, 23:59:59

For help, contact alp-staff@lists.iai.uni-bonn.de (staff only) or
alp-course@lists.iai.uni-bonn.de (staff and participants).

Please start working on the exercises early enough so that you can contact us in time in case of problems. Don't expect us to be available during weekend!

Task 1. *Unification* (3 Points)

Write down the term resulting from applying the respective substitution, e.g. $f(X)\{X \leftarrow 1\} \equiv f(1)$, or explain why the substitution cannot be applied.

- a) $f(X,Y)\{X \leftarrow 'Z'\}$
- b) $g(X,Y)\{X \leftarrow 2, Y \leftarrow g(X)\}$
- c) $h(X,Y)\{X \leftarrow h(Z,Y), Y \leftarrow h(Z), Z \leftarrow 3\}$
- d) $h(X,Y)\{X \leftarrow h(Z,Y)\}\{Y \leftarrow h(Z), Z \leftarrow 3\}$
- e) $h(X,Y)\{X \leftarrow h(Z,Y)\}\{X \leftarrow h(Z), Z \leftarrow 3\}$
- f) $h(X,Y)\{X \leftarrow h(Z,Y)\}\{Y \leftarrow h(Z), Z \leftarrow X\}$

Task 2. *Unification* (3 Points)

Give the most general unifier for all successful unifications. If the unification doesn't succeed describe why.

- a) $\text{likes}(\text{calvin}, \text{hobbes}) = \text{likes}(X, Y)$
- b) $\text{likes}(\text{calvin}, \text{hobbes}) = \text{likes}(X, \text{susie})$
- c) $\text{father}(\text{Jim}, \text{father}(X)) = \text{grandfather}(\text{john}, \text{jane})$
- d) $\text{append}([A, B, C], [D, E, F], G) = \text{append}([h, i, j], [k, l, m], [N | O])$
- e) $[a, [b | H] | C] = [a, b, c, d]$
- f) $[[X, Y], e | [y, z]] = [A, B, C, D]$

Task 3. *Deleting* (4 Points)

Write a predicate `delete(Elem, List, NewList)` that succeeds, if `NewList` is the same list as `List` but with all occurrences of `Elem` deleted. If element `Elem` does not occur in `List`, the predicate should succeed, too.

Task 4. *Deleting consecutive elements* (4 Points)

Write a predicate `delete_consecutive(List, NewList)` which succeeds, if `NewList` is the same list as `List` but with no consecutive identical elements. A consecutive identical element is an element that is the same as the element before or after it.

For example:

- `delete_consecutive([a, b, b, b, c, c, b], [a, b, c, b])` should succeed.
- `delete_consecutive([A, b, C, d], [A, b, c, d])` should succeed.
- `delete_consecutive([a, B, B,c,b], [a, B, c, b])` should succeed.

It is not sufficient to use the predefined predicate `delete/3`.

Task 5. *Deleting multiple occurrences* (4 Points)

Write a predicate `setify(List, NewList)` which succeeds, if `NewList` is the same list as `List` but with each element occurring only once (and at the corresponding order of its first occurrence in `List`).

For example: `setify([a, b, b, b, c, c, b], [a, b, c])` should succeed.