CSC 503 Homework Assignment 8

Out: October 5, 2015
Due: October 12, 2015

rsandil

1. (a)
   i. sum(x, 0, x)
   ii. sum(x, s(y), w) : - sum(s(x), y, w)
   (b)
   i. sum(x, 0, x)
   ii. sum(x, s(y), w) : - sum(s(x), y, w)
   iii. ¬ sum(s(0), s(s(0)), u)
   iv. From (ii) and (iii) using substitution {s(0)/x, s(0)/y, w/u, z/w }
   get :− sum (s(s(0)), s(0), z)
   v. From (ii) and (iv) using substitution {s(s(0))/x, 0/y, w/z, v/w}
   get :− sum (s(s(s(0))), 0, v)
   vi. From (i) and (v) using substitution {s(s(s(0)))/x, x/v}
   get □

2. (a) Alice ≠ Bob
   (b) ∀x (x = Alice ∨ x = Bob)
   (c) i) ¬Female (Bob)
   ii) ¬Woman (Bob)
   (d) CWA (DB) is consistent if we assume that names are unique and inconsistent if Alice and Bob are same.

3. (a) University(NCSU) – Abox because it is about instance of a concept.
   (b) GraduateStudent ≐ Student ⊓ ∃attends.GraduateCourse - Tbox because it is the definition of a concept.
   (c) ∃ y (GraduateStudent(x) ↔ Student(x) ∧ GraduateCourse(y) ∧ attends(x, y))
   (d) GraduateStudent ≐ Student ⊓ [∀attends.[GraduateCourse ⊓ [∀teaches.Professor]]]
   (e) ∀ y ∃ z(GraduateStudent(x) ↔ Student(x) ∧ GraduateCourse(y) ∧ attends(x, y) ∧
   Professor(z) ∧ teaches(z, y))