CS 427

HOMEWORK 4

BAKER, ALEX

Problem 1

Part A

1. unify((p X Y), (p a A)) return {a/X, A/Y}
    2. unify((p), (p)) return {}
        3. unify(p, p) return {}
        4. unify((), ()) return {}
    5. unify((X Y), (a A)) return {a/X, A/Y}
        6. unify((X), (a)) return {a/X}
            7. unify(X, a) return {a/X}
            8. unify((), ())) return {}
        9. unify((Y), (A)) return {A/Y}
            10. unify(Y, A) return {A/Y}
            11. unify((), ()) return {}

return {a/X, A/Y}

Part B

1. unify((ancestor X (father X)), (ancestor david george)) return FAIL
    2. unify((ancestor), (ancestor)) return {}
        3. unify(ancestor, ancestor) return {}
        4. unify((), ()) return {}
    5. unify((X (father X), (david, george)) return FAIL
        6. unify((X), (david)) return {david/X}
            7. unify(X, david) return {david/X}
            8. unify((), ()) return {}
        9. unify((father david), (george)) return FAIL
            10. unify((father), (george)) return FAIL
                11. unify(father, george) return FAIL

return FAIL

Part C

1. unify((q x), (not (q x))) return FAIL
    2. unify((q), (not)) return FAIL
        3. unify(q, not) return FAIL

return FAIL

Problem 2

9. amount_saved(15000)	
10. earnings(30000, steady)	
11. dependents(4)	
12. earnings(30000, steady) $\wedge$ dependents(4)	10 and 11
13. earnings(X, steady) $\wedge$ dependents(Y)	unify with 12 {30000/X, 4/Y}
14. earnings(30000, steady) $\wedge$ dependents(4) $\wedge \neg$greater(30000, 31000) $\rightarrow$ income(inadequate)	minincome(4) = 31000 unify with 7 {30000/X, 4/Y}
15. income(inadequate)	modus ponens with 10, 11, and def of greater
16. amount_saved(15000) $\wedge$ dependents(4)	9 and 11
17. amount_saved(X) $\wedge$ dependents(Y)	unify with 16 {15000/X, 4/Y}
18. amount_saved(15000) $\wedge$ dependents(4) $\wedge \neg$greater(15000, 20000) $\rightarrow$ savings(inadequate)	minsavings(4) = 20000 unify with 5 {15000/X, 4/Y}
19. savings(inadequate)	modus ponens with 9, 11, and def of greater
20. investment(savings)	modus ponens with 19 and 1

Problem 3

1. battery(dead)
    a. Battery does not have a charge
2. starter(working)
    a. The engine starter is working
3. lights(working)
    a. The lights are working
4. gas_tank(empty)
    a. Gas tank is empty
5. engine(wont_start)
    a. engine will not start
6. $\neg$battery(dead) $\wedge$ engine(wont_start) $\rightarrow$ $\neg$starter(working)
7. (engine(wont_start) $\wedge$ starter(working)) $\vee$ $\neg$lights(working) $\rightarrow$ battery(dead)
8. engine(wont_start) $\wedge$ starter(working) $\rightarrow$ gas_tank(empty)