Examples, Practice Problems, Assignment #1
PHIL 422 10 points

The assignment (9-18 below) is due AT THE BEGINNING OF CLASS on Thursday, September 5. Late work will not be accepted (this includes those coming late to class). For each of the following, determine whether it is a wff. If not, explain why not. If it is, explain why.

Worked Examples: [Answers in RED]

1.  \((P(a) \rightarrow (P(b) \rightarrow P(c)))\)
   Rule 0: “P(a),” “P(b),” “P(c)” are wffs
   Rule 4: “(P(b) \rightarrow P(c))” is a wff
   Rule 4: “(P(a) \rightarrow (P(b) \rightarrow P(c)))” is a wff
   Answer: WFF!

2.  \(\forall c (A(c) \rightarrow B(c))\)
   Rule 0: “A(c),” “B(c)” are wffs
   Rule 4: “(A(c) \rightarrow B(c))” is a wff
   Rule 6: “\(\forall c (A(c) \rightarrow B(c))\)” is NOT a wff because “c” is not a variable!
   Answer: Not a wff!

3.  \((\forall x (P(x) \rightarrow Q(x)) \land \exists y (P(y) \leftrightarrow R(y)))\)
   Rule 0: “P(x),” “Q(x),” “P(y),” “R(y)” are wffs
   Rule 5: “(P(y) \leftrightarrow R(y))” is a wff
   Rule 4: “(P(x) \rightarrow Q(x))” is a wff
   Rule 7: “\(\exists y (P(y) \leftrightarrow R(y))\)” is a wff
   Rule 8: “\(\forall x (P(x) \rightarrow Q(x))\)” is a wff
   Rule 2: “(\(\forall x (P(x) \rightarrow Q(x)) \land \exists y (P(y) \leftrightarrow R(y))\))” is a wff
   Answer: WFF!

Practice Problems (Work through these for Tuesday. We may do some of them in class.)

4.  \((P(a) \rightarrow \exists x (P(x) \land R(x)))\)
5.  \(\forall x (A(x) \land (B(x) \rightarrow C(x) \land D(y)))\)
6.  \(\forall x (F(x) \rightarrow G(x))\)
7.  \(\exists y (E(x) \land F(x))\)
8.  \(\exists x (Ax \land \forall x (Fx \rightarrow Gx))\)

Assignment (These are what you need to turn in on Thursday!)

9.  \(\forall x (F(x) \rightarrow \forall y H(x,y))\)
10. \(\neg \forall x ((F(x) \land G(x)) \rightarrow H(x))\)
11. \((\forall x (F(x) \rightarrow G(x)) \lor \forall x (G(x) \lor H(x)))\)
12. \(\neg \neg Ex (A(x) \land B(x))\)
13. \((P(a) \rightarrow \forall x (P(x) \rightarrow Q(x))) \rightarrow Q(a))\)
14. \(((A(a) \land B(b)) \rightarrow \forall xyz (P(x,y) \rightarrow Q(y,z)))\)
15. E(xcellent)
16. \(\forall x P(x) \& Qx\)
17. \(\exists x \exists y \exists z (P(x,y) \land P(y,z)) \rightarrow P(a,b)\)
18. \(((P(x) \land (P(y) \lor P(z)))\)