

## Computability and Logic

### HW 3

**Due: Friday, March 6**

Please submit LPL exercises using Submit! You can email to me all other Fitch files or other electronic files in a .zip file.

1. Consider the following argument:

$$\exists x G(x)$$
$$\forall x (G(x) \rightarrow D(x,x))$$
$$\therefore \exists x (G(x) \wedge \forall y D(x,y))$$

Demonstrate this argument to be valid or invalid using the truth-tree method. If the argument is invalid, also demonstrate it to be invalid using the truth-functional expansion method, starting with one object, and only adding one more object when needed. If the argument is valid, also demonstrate it to be valid using a formal proof (create a Fitch file).

2. Same as 1, but for problem 16 from the hand-out with Predicate Logic Arguments (some valid, some invalid).
3. From the handout with Predicate Logic Proofs (all valid), use resolution to prove arguments 9 and 15 to be valid. You do not have to follow the exact step-by-step algorithm in converting your statements to clauses as given by the handout, but you do have to show all non-trivial steps of this conversion.
4. Proofs or disproofs. Either prove valid using Fitch, or prove invalid using Tarski's World, and submit to Grade Grinder:

LPL 13.13, 13.30, 13.49

5. Use the tree method to demonstrate LPL 13.49 to be valid.