Name:_____ Section 8th __ 9th____ Grade:_____<-- instructor use

1. When is a (propositional) wff a *tautology*?

2. When we say a set of inference rules is *sound*, what do we mean?

3. What is a predicate?

   Give an example of a predicate application with no free variables

   with one or more free variables

4. When is a first-order wff a *sentence* (statement)?

5. Give an example of a model for $\exists x\ (\forall y\ (xy = 0))$

6. From { $\forall t(p(t) \rightarrow q(t))$, $\forall t(q(t) \rightarrow r(t))$, $\neg r(C)$}, prove $\neg p(C)$. Give reasons for your steps.

7. Consider the set of ordered pairs of non-negative integers. Working with another student, define a relation on this set that is a total ordering.

8. Working with another student, define a relation on the positive rational numbers that is a total ordering. Note that the ordering is on numbers, not just on strings that represent those of the numbers, but it may be described in terms of representations.

9. Working with another student, define a well-ordered relation on the rational numbers r with $0 < r < 1$. **Hint:** Think diagonal.

10. Working with another student, use (strong) induction to prove by that for any natural number n, $n(n+1)(n+2)$ is divisible by 6.

11. Tell your instructor about anything from today's session (or from the course so far) that you found confusing or still have a question about. If none, please write "None". Continue on the back if needed.