

## Math 301

### Quiz 4

10 points possible.

1. (3 pts.) State whether this argument is valid or invalid. Support your answer by drawing diagrams.

All animals are carnivores.

All carnivores are dogs.

Therefore, all animals are dogs.

2. (2 pts.) Find the mistake in this “proof.”

**Theorem.** *For all integers  $k$ , if  $k > 0$  then  $k^2 + 2k + 1$  is composite.*

*Proof.* For  $k = 2$ ,  $k^2 + 2k + 1 = 2^2 + 2 \cdot 2 + 1 = 9$ . But  $9 = 3 \cdot 3$ , and so 9 is composite. Hence the theorem is true.  $\square$

3. (5 pts.) Prove this statement (if it is true), or give a counterexample (if it is false).

**Theorem.** *The product of any two odd integers is odd.*