

Quiz 1

1. (5 points) Let p and q stand for propositions. For each of the following, determine whether or not the proposition is a tautology. (a) $(p \vee q) \rightarrow (\neg p \rightarrow q)$ (b) $p \wedge (q \vee \neg q)$ (c) $((p \rightarrow q) \rightarrow p) \rightarrow p$.

2. (5 points) Suppose $C(x) = "x \text{ is a cat}"$ and $Q(x, y) = "x \text{ is cuter than } y"$.

- (a) Express this statement using quantifiers: "There is a cat that is cuter than all other cats."
- (b) Express this statement using quantifiers: "There are two cats, each cuter than the other!"
- (c) Using quantifiers, give the negation of statement (a). Put it into a form where the symbol \neg only shows up immediately in front of a C or a Q .

(For fun #1) Let S be the statement “If S is true, then every rainbow has two ends and Leprechauns keep gold under them.” Rainbows do not have ends. Is S a proposition?

(For fun #2) Express this statement using quantifiers: “There are exactly two distinct cats.”