

Quiz 2

Student's name:

1. [50 points]

Prove the following equivalence by substitution, i.e., use known logical equivalences to show that $\neg(p \vee \neg q) \vee (\neg p \wedge \neg q)$ is equivalent to $\neg p$. *You must start from the statement $\neg(p \vee \neg q) \vee (\neg p \wedge \neg q)$.* Justify each step with the name of the corresponding logical equivalence being used. For full credit, do *not* skip steps.

$$\neg(p \vee \neg q) \vee (\neg p \wedge \neg q) \equiv \neg p$$

2. [50 points]

Using rules of inference with no substitution, prove that *modus ponens* is a valid rule. Use the notation introduced in class, and state, for each line, the rule of inference that justifies it. Make sure you do *not* to use *modus ponens* itself in your proof!

Modus ponens:

$p \rightarrow q$

p

—————

q

Write below the equivalent expression you need to prove:

Proof: