

3 pts. 6. Give a direct proof for the following theorem. For each step of your proof, indicate which rule of inference or equivalence law you are applying.

Premise 1:  $\neg g \vee h$

Premise 2:  $h \rightarrow \neg i$

Premise 3:  $(\neg i \wedge g) \rightarrow k$

Prove:  $g \rightarrow k$

1)  $g$  Assume the antecedent of the implication ( $g \rightarrow k$ ).

2)  $h$  Disjunctive syllogism applied to (1) and Premise 1.

3)  $\neg i$  Modus ponens applied to (2) and Premise 2.

4)  $(\neg i \wedge g)$  Conjunction applied to (1) and (3).

5)  $k$  Modus ponens applied to (4) and Premise 3.

$\therefore$  If  $g$  is true,  $k$  must be true, so  $g \rightarrow k$ .