

Q1. Show that the premises “It is not sunny this afternoon and it is colder than yesterday,” “We will go swimming only if it is sunny,” “If we do not go swimming, then we will take a canoe trip,” and “If we take a canoe trip, then we will be home by sunset” lead to the conclusion “**We will be home by sunset.**”

p: It is not sunny this afternoon

q: it is colder than yesterday

r: We will go swimming

s: we will take a canoe trip

t: we will be home by sunset

$p \wedge q$

$r \rightarrow \sim p \equiv \sim(\sim p) \rightarrow \sim r \equiv p \rightarrow \sim r$

$\sim r \rightarrow s$

$p \rightarrow s$

$p \wedge q$

$p$

$p \rightarrow s$

$s \rightarrow t$

$p \rightarrow t$

$p$

•  $t$  (*Modus Ponens*)

Q2. Show that the premises “If you send me an e-mail message, then I will finish writing the program,” “If you do not send me an e-mail message, then I will go to sleep early,” and “If I go to sleep early, then I will wake up feeling refreshed” lead to the conclusion “If I do not finish writing the program, then I will wake up feeling refreshed.”

p: you send me an e-mail message

q: I will finish writing the program

r: I will go to sleep early

s: I will wake up feeling refreshed

**$p \rightarrow q \equiv \sim q \rightarrow \sim p$**

**$\sim p \rightarrow r$**

**$r \rightarrow s$**

**Using transitivity,**

**$\sim p \rightarrow s$**

**$\sim q \rightarrow \sim p$**

**$\sim p \rightarrow s$**

**Using transitivity, •  $\sim q \rightarrow s$**