

Math 101 - Exam 2 - Logic Problem Solutions

1. a)



All musicians are artists
No musicians are rich

- b) no - some artists can be rich (just not musicians)
c) Being musician is sufficient for being artist

2. a) $p \vee \sim r$

b) $\sim(p \vee \sim r) \equiv \sim p \wedge r$

c) He is not an elephant and he forgets

d) $p \wedge \sim q \rightarrow \sim r$

3. p: It's raining

q: I'll go to park

a) $\sim p \rightarrow q$

converse b) $q \rightarrow \sim p$ If I go to park, it's not raining

inverse c) $p \rightarrow \sim q$ If it's raining, I don't go to park

contradiction d) $\sim q \rightarrow p$ If I don't go to park, it's raining

4.

p	q	$p \rightarrow q$	$\sim(p \rightarrow q)$
T	T	T	F
T	F	F	T
F	T	T	F
F	F	T	F

p	q	$\sim q$	$p \wedge \sim q$
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	F

① $\sim p \rightarrow q$

② $p \wedge \sim q$

Yes, equivalent. If the instructions had not stated "Use truth tables..." we could have stated that this is true by negation of conditionals

5.

p: sick

q: I take medicine

a) Hyp 1: $s \rightarrow m$ | $p \rightarrow q$
Hyp 2: $\sim s \vee m$ | $\sim p \vee q$
Concl: $\sim m$ | $\sim q$

b)

		H_1		H_2		$H_1 \wedge H_2$		C	$H_1 \wedge H_2 \rightarrow C$
p	q	$p \rightarrow q$	$\sim p$	$\sim p \vee q$	$H_1 \wedge H_2$	$\sim q$	C	$H_1 \wedge H_2 \rightarrow C$	
T	T	T	F	T	T	F	F	F	
T	F	F	F	F	F	T	T	T	
F	T	T	T	T	F	F	F	F	
F	F	T	T	T	T	T	T	T	

↑
Invalid

There are 2 conditions that create invalid situations

① TT, when I'm sick and I take medicine

② FT, when I'm not sick and I take medicine