Math 102

Name _____

(Due Friday, 9/23)

3.3 Conditional and Biconditional

1. Complete the following truth tables. Circle your final answers.

(a)

p	q	$p \rightarrow q$	$\sim q \rightarrow \sim p$	$\sim p \vee q$	$p \wedge (\sim q)$	$\sim (p \leftrightarrow q)$
T	T					
T	F					
F	T					
F	F					

(b)

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

2. Use truth tables to argue that $p \rightarrow (q \wedge r)$ is logically equivalent to $(p \rightarrow q) \wedge (p \rightarrow r)$.

p	q	r	$p \rightarrow (q \wedge r)$	$(p \rightarrow q) \wedge (p \rightarrow r)$
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

3. In each write out the (*i*) contrapositive, (*ii*) converse and (*iii*) inverse of the given conditional statement.

 (a) If you score 100% on each exam, then you will earn an ***A*** grade in the course.

   (*i*) contrapositive:

   (*ii*) converse:

   (*iii*) inverse:

 (b) If the horse does not run fast, then the horse will lose the race.

   (*i*) contrapositive:

   (*ii*) converse:

   (*iii*) inverse:

4. Assume ***m*** represents "living in Minnesota", ***c*** represents living in Clay County (of Minnesota)" and
    h represents "living in Moorhead (of Clay County).

 (a) Symbolize each of the following:

   (*i*) One is living in Minnesota if one is living in Moorhead.

   (*ii*) One can live in Clay County only if one lives in Minnesota.

   (*iii*) Living in Minnesota is not sufficient for living in Moorhead.

 (b) In each fill in the slot with the appropriate word - either "necessary" or "sufficient" and then
      symbolize the compound statement.

   (*i*) Living in Moorhead is _____ for living in Minnesota.

   (*ii*) Living in Minnesota is _____ for living in Clay County.