Practice Exercises for Mathematical Logic

1.

p	q	~p	p∧q	p∨q	p→q
T	T		T	T	T
T	F	F		T	F
F	T	T	F		T
F	F	T	F	F	

2.

p	q	~q	p∧q	(p∧q)→~q
	T	F	T	F
T	F		F	T
F	T	F		T
F	F	T	F	

3.

x	y	x→y	y→x	(x→y)∧(y→x)	x↔y
T	T		T	T	T
T	F	F		F	F
F	T	T	F		F
F	F	T	T	T	

4. Which of the following statements from problem 3 is conditional?

- **x**
- **y**
- **x↔y**
- None of the above.

RESULTS BOX:

5. Which of the following statements from problem 3 is biconditional?

- $x \rightarrow y$
- $y \rightarrow x$
- $x \leftrightarrow y$
- None of the above.

RESULTS BOX:

6.

a	b	$a \rightarrow b$	$(a \rightarrow b) \wedge a$	$[(a \rightarrow b) \wedge a] \rightarrow b$
T		T	T	T
T	F		F	T
F	T	T		T
F	F	T	F	

7. Choose the word that best completes this sentence:
The statement in the last column of the truth table in problem 6 is a _____.

- Biconditional
- Tautology
- Disjunction
- None of the above.

RESULTS BOX:

8.

p	q	~q	$p \rightarrow \sim q$	$p \wedge q$	$\sim(p \wedge q)$	$(p \rightarrow \sim q) \leftrightarrow [\sim(p \wedge q)]$
T	T	F		T	F	T
T	F	T	T		T	T
F	T	T	T	F		T
F	F	T	T	F	T	

9. Which two statements from problem 8 are logically equivalent?

- **$p \rightarrow \sim q$ and $p \wedge q$**
- **$p \wedge q$ and $\sim(p \wedge q)$**
- **$p \rightarrow \sim q$ and $\sim(p \wedge q)$**
- None of the above.

RESULTS BOX:

10. Choose the word that best completes this sentence:
The _____ of two equivalent statements always yields a tautology.

- Biconditional
- Conjunction
- Negation
- All of the above.

RESULTS BOX: