ID:_____   Name:_____

1. Given two propositions p and q. Find $p \vee q$ and $p \oplus q$

   p: "A combo meal includes a salad with dinner."

   q: " A combo meal includes a soup with dinner."

   $p \vee q$: _A combo meal includes a salad or a soup dinner_ .

   $p \oplus q$: _A combo meal includes a salad or a soup, but not both, with dinner_

2. Definition of **Conditional statement of two propositions**: Let p and q be two propositions.

   The _Conditional statement_ "$p \to q$" is the proposition " _If p, then q_." In the

   conditional statement $p \to q$, p is called _hypothesis_ or _premise_ and q is called

   conclusion or _consequence_

   A conditional statement is also called an _implication_ .

3. The truth table for the conditional statement $p \to q$:

p	q	$p \to q$
T	T	T
T	F	F
F	T	T
F	F	T

The conditional statement $p \to q$ is **false** when p is _true_ and q is _false_ , and true otherwise.

In fact, $p \to q$ is **true** when both p and q are _true_ and when p is _false_ (no matter what

truth value q has).

4. Using the given conditional statement to understand the truth table.

$$\underset{p}{\text{"If } \boxed{\text{I am elected,}}} \text{ then } \underset{q}{\boxed{\text{I will lower taxes}}}\text{"}$$

T → T : T expected
F → T   T not expected
F → F   T
T → F   F break the pledge

5. A variety of terminology used to express $p \to q$:

Given two propositions p: "It is sunny." and q : "I wear sunglasses." And we have

"If p, then q.": _If it is sunny, then I wear sunglasses_ .

The following statements are the different ways to express $p \to q$:

Group I.

"If p, q.": _If it is sunny, I wear sunglasses_ .

"p implies q.": _It is sunny implies I wear sunglasses_.

"p only if q.": _It is sunny only if I wear sunglasses_.

Group II.

"q if p."; "q whenever p."; "q when p."; "q follows from p."; "q provided that p.":

I wear sunglasses . if (whenever, when, follows from, provided that) it is sunny

"q unless $\neg p$.": _I wear sunglasses unless it is NOT sunny_

Group III.

" p is (a) sufficient (condition) for q.": _It is sunny is sufficient for I wear. sunglasses_

(" sufficient" means if ___P___ , then ___q___ is guaranteed).

" q is a necessary (condition) for p.": _I wear sunglasses is necessary for it is sunny_

(" necessary" means if ___not q___ , then ___not P___, that is, $\neg q \to \neg p$).

"Only if" and "necessary" are related to the contrapositive proposition of $p \to q$

6. The **Converse**, **Contrapositive**, and **Inverse** of a conditional statement $p \to q$:

Converse: The proposition $q \to p$ is called ___Converse___ of $p \to q$.

Contraposition: The proposition $\neg q \to \neg p$ is called ___contrapositive___ of $p \to q$.

Inverse: The proposition $\neg p \to \neg q$ is called ___Inverse___ of $p \to q$.