

Math 1332  
Chapter 3

**Section 1**

Statement: sentence that is either true or false, but not both at the same time.

Negation: change of a statement to make its meaning opposite.

Quantified Statement: statements with quantifiers

Quantifier: all, none, some, no

Equivalent Ways to write Quantifiers

All A are B  $\rightarrow$  There are no A that are not B.

Some A are B  $\rightarrow$  There exists at least one A that is B.

No A are B  $\rightarrow$  All A are not B.

Some A are not B  $\rightarrow$  Not all A are B.

Negations of Quantified Statements

All A are B  $\rightarrow$  Some A are not B

Some A are B  $\rightarrow$  No A are B

**Section 2**

Simple Statements: conveys one idea, not connecting words.

Compound Statements: combination of simple statements connected by connecting words

Connectives: Connecting words: and, or, if ... then, if and only if

Conjunction:  $p \wedge q$ : "p and q"

Disjunction:  $p \vee q$ : "p or q"

Conditional:  $p \rightarrow q$ : "if p then q"

Biconditional:  $p \leftrightarrow q$ : "p if and only if q"

Negation:  $\sim p$ : "not p"

### Section 3

Conjunction: True only when BOTH are true

Disjunction: False only when BOTH are false

\*\*\* Equivalent statements have same exact values in the truth tables in every possible case.

### Section 4

Conditional: False only when 1<sup>st</sup> case is true and the 2<sup>nd</sup> case is false

Biconditional: True only when BOTH are the same.

Tautology: compound statement that is always true

### Section 5

Contrapositive: if p then q  $\equiv$  if not q then not p :  $p \rightarrow q \equiv \sim q \rightarrow \sim p$

Inverse of Conditional:  $\sim p \rightarrow \sim q$

Converse of Conditional:  $q \rightarrow p$

Negation of Conditional:  $p \wedge \sim q$

DeMorgan's Law:

$$\sim (p \wedge q) \equiv \sim p \vee \sim q$$

$$\sim (p \vee q) \equiv \sim p \wedge \sim q$$

### Section 6

Argument: premises and a conclusion

- Valid: conclusion is true when premises are assumed true

- Invalid: fallacy: not valid

### How to test Validity

1. Label p's and q's
2. Express argument symbolically
3. premise 1  $\wedge$  premise 2  $\wedge$  premise 3  $\wedge$  .....
4. Build truth table
5. Is it a tautology?
  - Yes, means argument is valid
  - No, means argument is invalid

### **Section 7**

#### Euler Diagram and Arguments

1. Draw Euler Diagram for first premise
2. Draw Euler Diagram for second premise
3. Is there any way you can draw the second premise to where it satisfies the premise but not the conclusion? Is there a contradiction?
  - Yes, argument is invalid.
  - No, argument is valid