
Mat114
Review of Chapter 1.

1. Arguments

- Syllogism.

$$\begin{array}{l} \text{If A then B.} \\ \text{A.} \\ \hline \text{Therefore, B.} \end{array}$$

- Venn diagrams: (a) All A are B, (b) No A is B, (c) Some A are B.

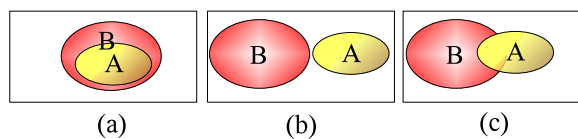


Figure 1: Venn diagrams.

- A **statement** is a sentence which is either true or false.

2. Logical operators

- **Negation** of p , $\sim p$, It is not the case than p .
- **Conjunction** of p and q , $p \wedge q$, p and q .
- **Disjunction** of p and q , $p \vee q$, p or q .
- **Conditional** $p \rightarrow q$, If p then q .
- **Biconditional** $p \leftrightarrow q$, p if and only if q .

3. Truth tables

- If there are n independent variables in a compound statement then the number of rows in a truth table is 2^n .

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

4. Conditionals

- For $p \rightarrow q$ **converse** is $q \rightarrow p$, **inverse** is $\sim p \rightarrow \sim q$, **contrapositive** is $\sim q \rightarrow \sim p$.
- $p \rightarrow q$ can be written as *If p then q, All p are q, p only if q, q if p.*
- $p \rightarrow \sim q$ can be written as *No p is q.*

5. Equivalent expressions

- $p \rightarrow q \equiv \sim q \rightarrow \sim p$, $p \rightarrow q \equiv \sim p \vee q$, $\sim (p \rightarrow q) \equiv p \wedge \sim q$.
- $\sim (p \wedge q) \equiv \sim p \vee \sim q$, $\sim (p \vee q) \equiv \sim p \wedge \sim q$.

6. More arguments

- A **tautology** is a statement which is always true.