studyguide

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Contents

1 Chapter 1

1.1 Propositional Logic

1.1.1 Converse Contrapositive and Inverse (p -> q)

- Coverse
  - q $\rightarrow$ p
- Contrapositive
  - q $\rightarrow \neg$p
- Inverse
  - $\neg$p $\rightarrow \neg$q

1.2 Applications of Propositional Logic

1.2.1 Examples of turning sentences into propositional Logic.

1.3 Propositional Equivalences

1.3.1 Logical Equivalences

p$\wedge T$	p	Identity Laws
p$\vee F$	p	
p$\vee T$	T	Domination Laws
p$\wedge F$	F	
p$\vee p$	p	Idempotent Laws
p$\wedge p$	p	
$\neg(\neg$p)	p	Double Negation Laws
p$\vee q$	q$\vee p$	Commutative Laws
p$\wedge q$	q $\wedge p$	
(p$\vee q) \vee r$	p$\vee(q \vee r)$	Associative Laws
(p$\wedge q) \wedge r$	p $\wedge(q \wedge r)$	
p$\vee(q \wedge r)$	(p$\vee q) \wedge (p \vee r)$	Distributive Laws
p $\wedge(q \vee r)$	(p$\wedge q) \vee (p \wedge r)$	
$\neg$(p$\wedge q$)	$\neg$p$\vee q$	De Morgans Laws
$\neg$(p v q)	$\neg$p$\wedge q$	
p$\vee(p \wedge q)$	p	Absorption Laws
p $\wedge(p \vee q)$	p	
p v $\neg$p	T	Negation Laws
p$\wedge p$	F	

1.3.2 Logical Equivelances Involving Conditional Statements

$\mathrm{p} \to q$	$\neg \mathrm{p} \vee q$
$\mathrm{p} \to q$	$\neg \mathrm{q} \to p$
$\mathrm{p} \vee q$	$\neg \mathrm{p} \to q$
$\mathrm{p} \wedge q$	$\neg(\mathrm{p} \to q)$
$\neg(\mathrm{p} \to q)$	$\mathrm{p} \wedge q$
$(\mathrm{p} \to q) \wedge (p \to r)$	$\mathrm{p} \to (q \wedge r)$
$(\mathrm{p} \to r) \wedge (q \to r)$	$(\mathrm{p} \vee q) \to r$
$(\mathrm{p} \to q) \vee (p \to r)$	$\mathrm{p} \to (q \vee r)$
$(\mathrm{p} \to r) \vee (q \to r)$	$(\mathrm{p} \wedge q) \to r$

1.3.3 Logical Equivalences Involving Biconditional Statements

$\mathrm{p} \leftrightarrow q$	$(\mathrm{p} \to q) \wedge (q \to p)$
$\mathrm{p} \leftrightarrow q$	$\neg \mathrm{p} \leftrightarrow q$
$\mathrm{p} \leftrightarrow q$	$(\mathrm{p} \wedge q) \vee (p \wedge q)$
$\neg(\mathrm{p} \leftrightarrow q)$	$\mathrm{p} \leftrightarrow q$

1.4 Predicates and Quantifiers

1.4.1 Quantifiers

- Universal Quantifer
  - $\forall(\mathrm{x})\ \mathrm{P}(\mathrm{x})$
  - $\exists$
  - $\emptyset$

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