


Liberal Arts Mathematics I
MGF1106
Logic Summary
I. Symbols

\wedge	and
\vee	or
$P \rightarrow Q$	If ..., then ...
\sim	negation

II. Simple & Compound Statements

<u>Statement</u>	<u>Negation</u>
P	$\sim P$
$P \wedge Q$	$\sim P \vee \sim Q$
$P \vee Q$	$\sim P \wedge \sim Q$

De Morgan's Laws

$\sim (P \wedge Q)$	$\sim P \vee \sim Q$
$\sim (P \vee Q)$	$\sim P \wedge \sim Q$

III. Quantified Statements

<u>Statement</u>	<u>Negation</u>
All A are B	Some A are not B
No A are B	Some A are B
Some A are B	No A are B
Some A are not B	All A are B

<u>Statement</u>	<u>Equivalent</u>
All A are B	There are no A that are not B
	If it is A , then it is B
Some A are B	At least one A is B
Some A are not B	Not all A are B

IV. Conditional Statements

<u>Statement</u>	<u>Negation</u>
$P \rightarrow Q$	$P \wedge \sim Q$

<u>Statement</u>	<u>Equivalent</u>
$P \rightarrow Q$	$\sim Q \rightarrow \sim P$
$P \rightarrow Q$	$\sim P \vee Q$
$\sim (P \rightarrow Q)$	$P \wedge \sim Q$



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IV. Conditional Statements (continued)

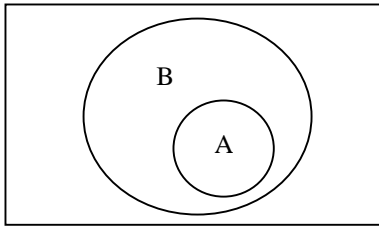
Other Equivalents

P sufficient for Q Note: same order as
P only if Q standard conditional

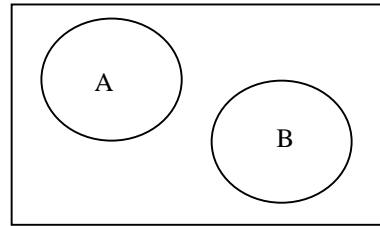
Q necessary for P Note: reverse order compared
Q if P to standard conditional

V. Valid Arguments, Euler diagrams
(used to determine quantified arguments)

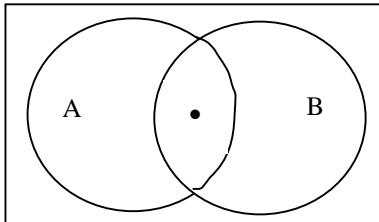
All A are B



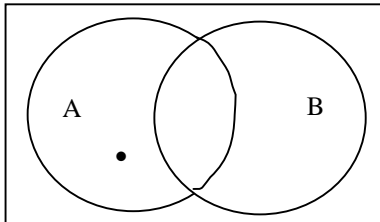
No A are B



Some A are B



Some A are not B



VI. Valid Arguments, Conditional Forms

(These are five commonly used conditional arguments. There are many more valid arguments. Truth tables can be used to verify the validity on these five and many others)

- | | | | | |
|--------------------------|------------------------------------|--|-------------------------------|-------------------------------|
| a. $P \rightarrow Q$ | b. $P \rightarrow Q$ | c. $P \rightarrow Q$ | d. $P \vee Q$ | e. $P \vee Q$ |
| $\frac{P}{\therefore Q}$ | $\frac{\sim Q}{\therefore \sim P}$ | $\frac{Q \rightarrow R}{\therefore P \rightarrow R}$ | $\frac{\sim Q}{\therefore P}$ | $\frac{\sim P}{\therefore Q}$ |