This document is intended as a study guide, and as a resource for the mid term examination. You will be provided a copy as part of the exam. DO NOT BRING YOUR COPY WITH YOU TO THE EXAM.

1 Logical Equivalances

Name	Equivalence
Identity laws	$p \wedge \mathbf{T} \equiv$ $p \vee \mathbf{F} \equiv$
Domination laws	$p \vee \mathbf{T} \equiv$ $p \wedge \mathbf{F} \equiv$
Idempotent laws	$p \vee p \equiv$ $p \wedge p \equiv$
Double Negation law	$\neg(\neg p) \equiv$
Commutative laws	$p \vee q \equiv$ $p \wedge q \equiv$
Associative laws	$(p \vee q) \vee r \equiv$ $(p \wedge q) \wedge r \equiv$
Distributive laws	$p \vee (q \wedge r) \equiv$ $p \wedge (q \vee r) \equiv$
De Morgan's laws	$\neg(p \wedge q) \equiv$ $\neg(p \vee q) \equiv$
Absorption laws	$p \vee (p \wedge q) \equiv$ $p \wedge (p \vee q) \equiv$
Negation laws	$p \vee \neg p \equiv$ $p \wedge \neg p \equiv$
Implication Equivalence	$p \rightarrow q \equiv$
Biconditional Equivalance	$p \leftrightarrow q \equiv$

You will also be responsible for the Set Identities (table 1 p.124 of text or on page 24b of lecture notes for the third Lecture). However, since the set identities are essential the same as the logical equivalances this should be enough for you to remember by.

2 Rules of Inference

Name	Equivalence		
Modus Ponens	p $\underline{p \rightarrow q}$ $\therefore$	Modus tollens	$\neg q$ $\underline{p \rightarrow q}$ $\therefore$
Hypothetical syllogism	$p \rightarrow q$ $\underline{q \rightarrow r}$ $\therefore$	Disjunctive syllogism	$p \vee q$ $\underline{\neg p}$ $\therefore$
Addition	$\underline{p}$ $\therefore$	Simplification	$\underline{p \wedge q}$ $\therefore$
Conjuction	p $\underline{q}$ $\therefore$	Resolution	$p \vee q$ $\underline{\neg p \vee r}$ $\therefore$

3 Rules of Inference for Quantified Statements

Universal instantiation	$\underline{\forall x P(x)}$ $\therefore$	Universal generalization	$\underline{P(c) \text{ for an arbitrary } c}$ $\therefore$
Existentail instantiation	$\underline{\exists x P(x)}$ $\therefore$	Existentail generalization	$\underline{P(c) \text{ for some element } c}$ $\therefore$

4 Additional Things to Know

You are responsible for all material we have covered in the lectures and in the material in the corresponding sections of the textbook. You may be asked questions related to the content of Table 1 on p.144 (Properties of Floors and Ceilings) and Table 2 on p. 157. These correspond to tables on p.32 and p.34b (only the formulas indicated) in Lecture 4.