Test 1 Topics CS220

Propositional & Predicate Logic
- Definition of a proposition
- Definition of a predicate
- Logic connectors such as: negation, and, inclusive or, exclusive or, conditional, bi-conditional
- How to prove equivalence using truth tables
- Definition of a tautology, contingency, & contradiction and how to show in a truth table
- Universal quantifier, Existential quantifier
- Equivalences involving negation of universal and existential quantifiers

Rules of Inferences
- Definition of rules of inference
- Use truth tables to determine if a rule of inference is valid or not valid
- Be able to derive a conclusion by applying rules of inferences to the premises

Proof techniques
- Direct Proofs
  - Definition of a direct proof
  - Be able to prove statement using direct proof technique
- Indirect Proofs
  - Contraposition
    - Know the principles behind a contraposition proof
    - Be able to prove statement using contraposition proof
  - Contradiction
    - Know the principles behind a contradiction proof
    - Be able to prove statement using contradiction proof
- Proof by cases
  - Know the principle behind proof by cases
  - Be able to prove statement using proof by cases

Program Correctness
- Pre and post conditions
- Loop invariants
  - Proof rule for while loops

Sets & Functions
- N, Z, Q, R
- Sets: equivalence, union, intersection, difference, universal set
- Cardinality
- Subsets and Proper Subsets
- Tuples
- Cartesian product
- Power set
- Function
  - Definition
  - Increasing, Strictly increasing
  - Injection, surjection, bijection
  - Composition, inverse