Topics for final exam

1. Direct and indirect proofs.
2. How do we prove general sentences?
3. Proof by cases.
4. Schema of definition of a predicate.
5. Schema of a definition of a function symbol; uniqueness and existence conditions.
6. Schema of a definition of a constant symbol; uniqueness and existence conditions.
7. Mathematical induction, its equivalent versions (including the least number principle and ordinal induction).
8. A schema of inductive proof.
9. Axiom schema of abstraction and Russell's paradox.
10. Axiom schema of comprehension (formulation and applications).
11. Axiom of extensionality (formulation and applications).
12. Axioms of union and pairing (formulation and applications).
13. The notion of an ordered pair in set theory.
14. The notion of a power set, the power set axiom.
15. The operation of Cartesian product of sets.
16. Binary relations and their formal properties.
17. Ordering, linear ordering.
18. The notion of a well-ordered set.
19. Isomorphism of relational structures.
20. Axiom of foundation (formulation and applications).
21. Axiom of infinity (formulation and applications).
22. The notion of a natural number in set theory (construction of the set ω).
23. Axiom of choice (formulation and applications).
24. Functions and their properties. Injections, surjections, bijections.
25. Equipollence of sets.
26. Cantor's theorem.
27. Countable and uncountable sets.