

Here are some random practice problems. These are not a complete list of the type of problems you might be asked on the final, but doing these will certainly help you.

1. Give the hypothesis, conclusion, converse, contrapositive, and negation of the implication

If all pigs have wings, then cows are dumb or chickens have lips.

2. Show the compound proposition $p \Rightarrow (p \vee q)$ is a tautology.
3. Let \mathcal{U} be the set of integers from 1 to 25, A be the set of odd integers in \mathcal{U} , and B be the set $\{4, 5, 6, \dots, 12\}$. Describe $A \cup B$, $A \cap B$, and A' .
4. If $C = \{a, b\}$ and $D = \{3, 5, 6\}$, find $C \times D$.
5. Find the prime factorizations of both the year you were born and your age. How many divisors does each have? What is their greatest common divisor? Their least common multiple?
6. What is your age in base two? If Fred's age is 302112 in base four, what is his age in base ten?
7. Give an example of a finite plane figure whose symmetry type is C_3 . Give another whose symmetry type is D_4 .
8. Give an example of a frieze pattern whose symmetry type is TR_T . Give another whose symmetry type is TG .
9. Is it possible for a product of seventeen reflections to be a rotation? Why or why not?
10. Give an example of two motions such that each has fixed points but their product doesn't.
11. How many degrees does the minimal counterclockwise rotation S have in the group D_7 ?

12. Write the group table for the group \mathbb{Z}_6 (the clock group $\{0, 1, \dots, 5\}$). What is its identity? Pair each element with its inverse. Is the group commutative? Find a two-element subgroup of \mathbb{Z}_6 (there is only one of them) and find all its cosets.
13. Can a group G with 125 elements have a subgroup with 7 elements? Why or why not?
14. Draw the following graphs: K_6 , C_4 , and $K_{2,4}$.
15. Draw a graph with 6 vertices, one cut edge, and two cut vertices. Write down its adjacency matrix.