

Study Guide for Exam 2

Polya's Problem-Solving Principles

1. Understand the Problem
2. Devise a Plan
3. Carry Out the Plan
4. Look Back

Be able to work through these steps for a given problem. Be able to discuss what each step means in general.

Problem Solving Strategies

1. Guess and Check
2. Make an orderly list
3. Draw a Diagram
4. Look for a Pattern
5. Make a Table
6. Use a Variable
7. Consider Special Cases
8. Solve an Equivalent Problem
9. Solve an Easier Similar Problem
10. Argue from Special Cases
11. Work Backward
12. Eliminate Possibilities
13. The Pigeonhole Principle

14. Use Inductive Reasoning

15. Use Deductive Reasoning

Given a problem, be able to tell me which of the above strategies you used to solve the problem. Be able to create and solve a problem using a particular strategy I give you. Especially look at homework problems and in-class examples.

Divisibility of Natural Numbers

1. Know the definitions of a prime number, a composite number, and a unit.
2. Be able to use a factor tree or division to find the prime factors of a number.
3. Know how to write a number in its prime-power representation.
4. Be able find all factors of a number. Know how many there should be.
5. Know how to use the square root of a number to more easily determine if it is prime.
6. Be able to quickly check if a number is divisible by 2, 3, 5, 6, 7, 8, 9, 10, 11, and 13. Be able to explain or write out each of the rules for the above numbers. You do not need to prove that they are true.

Greatest Common Factor and Least Common Multiple

1. Use Set Intersection to find $\text{GCD}(a,b)$ and $\text{LCM}(a,b)$.
2. Use Prime-power representation to find $\text{GCD}(a,b)$ and $\text{LCM}(a,b)$.
3. Use the Euclidean Algorithm to find $\text{GCD}(a,b)$ and $\text{LCM}(a,b)$.
4. Be able create a word problem in which you would need GCM or LCM to find the answer.