Review for Test 2, 10/26/2005

October 21, 2005

1. **Algorithms:**
   - Searching: the linear search, the binary search
   - Sorting: the bubble sort, the insertion sort.

2. **$O$-notation:**
   - Showing that $f(x) = O(g(x))$ using $C$ and $k$.
   - Showing that $f(x)$ is not $O(g(x))$.
   - $O$-estimate for various functions: polynomials, rational functions, logarithms, exponential function, factorial function, the sums.

3. **Basics of Number Theory:**
   - Properties of division relation. For example: $a|b$ and $b|c$ implies $a|c$.
   - Prime numbers, properties of primes, Fundamental Theorem of Arithmetic.
   - Modulo operation and modulo relation.

4. **Euclidean Algorithm**
   - Finding $gcd$ using Find $gcd(50, 144)$ using the Euclidean Algorithm.
   - Fact that Euclidean Algorithm is correct (with proof).

5. **Algorithms for the change of basis.**

7. Summations: formulas for the sums of arithmetic and geometric progressions.

8. Induction
   - Why does it work?
   - Identities, inequalities, other statements that can be proved using induction.