1. Division Algorithm (DA)
   (a) Find $q$ and $r$ given $a$ and $b$.
   (b) Use DA in algorithms that require repeated division.

2. Arithmetic in other bases
   (a) Decimals and representations of integers and fractions.
   (b) Conversion of repeating decimals to quotients.
   (c) Construction of base $b$ addition and multiplications tables for the digits $0, 1, 2, \ldots, b - 1$.

3. The Fundamental Theorem of Arithmetic (existence and uniqueness of prime factorization), and its consequences.
   (a) Counting the number of divisors of a number.
   (b) Finding GCDs and LCMs
   (c) Divisibility Rules
   (d) Using FTA to prove irrationality.

4. Counter games including Bouton’s Nim

5. The Euclidean Algorithm
   (a) The decanting problem
   (b) Solving other diophantine equations. (See the coin problems, examples 1 and 2 in lecture 2, for example.)

6. Mathematical Induction

7. Modular arithmetic. Finding remainders when large numbers, given in decimal or exponential form, are divided by single digit numbers and 11.