1 Additive Number Systems

Problem 1. Perform the following computations using Roman numerals. Try to do this without converting into our usual Hindu-Arabic numerals, and make sure you discuss your ideas with your groupmates.

(a) $DCLXXIII + CCXLVIII =$

(b) $DCCXIV \times LXVII =$

(c) Can you describe a general algorithm or list of steps to add and multiply in the Roman numeral system? How would you explain this algorithm to students just learning how to do arithmetic?
2 Place Value and Chip Models

Problem 2. (Note: Once you understand the patterns for this problem, it should go very quickly.) Write the natural numbers from 1 to 30 in

(a) base 5:

(b) base 2:

Problem 3. There are several different strategies that one could use to construct a chip model for a given number. Throughout this problem (and especially on parts (b) and (c), try to decide what strategy will be the most efficient.)

(a) Draw a (base 10) chip model for the number 376.

(b) Draw a base 5 chip model for the number 376. Using this chip model, convert 376 into base 5.
(c) Draw a base 2 chip model for the number 376. Using this chip model, convert 376 into base 2.

**Problem 4.** Using a chip model, convert the number \((254)_{5}\) into base 10.

3 Reading Assignment

Study the following sections from your textbook before the next class: 1.1, 1.2, 1.3, 1.4

Keywords\(^1\): set model, measurement model, properties of addition and subtraction, “thinking strategies” in sections 1.3 and 1.4

\(^1\)These “keywords” are the most important definitions from the reading assignment. Some of these words may already be familiar to you, but make sure you carefully read the book’s definition anyway. Many words have a very precise mathematical definition that differs from the definitions you may have seen before.