Activities — More on Comprehension

In these exercises, only use comprehension.

1. Create a list of the first 20 powers of 2: [1, 2, 4, 8, 16, 32, 64, 128, …]

2. Create a list of all numbers between 10000 and 20000 that have last digit 3 and are divisible by 13.

3. Create the set of all differences of two numbers in the list [20,10,5,18,9].

4. Create the set of all numbers between 1 and 100 that can be written as a power i^j of integers i and j, $j \geq 2$.

5. Create the set of all numbers between 1 and 100 that cannot be written as a power i^j of integers i and j, $j \geq 2$.

6. Create a dictionary that associates the key $\dfrac{i(i-1)(i-2)}{6}$ with the value i^3 for $i \in \{3,4,5,\ldots,100\}$. The dictionary starts out with `{1: 27, 4: 64, 10: 125, 20: 216, 35: 343, … }`.

7. Given a function of a single parameter `func(i)` where the parameter is supposed to be an integer, create a dictionary that associates the key `func(i)` with `i` for all `i` in range(100).

8. Find all integers s between 1 and 1000 that can be written as $s = 3 \cdot n + 4$ and as $s = m^2 + 1$. Hint: First create the sets $\{3 \cdot n + 4 \,|\, 1 \leq 3 \cdot n + 4 \leq 1000, n \in \mathbb{N}\}$ and $\{n^2 + 1 \,|\, 1 \leq n^2 + 1 \leq 1000, n \in \mathbb{N}\}$ and then use the & operator to obtain the intersection.