Self test questions: Comprehension

1. Create a list of all numbers between 0 and 100 that are not divisible by 3. (Hint: x is not divisible by 3 if \( x \% 3 \neq 0 \).)

2. Create a list of all numbers between 0 and 100 that are divisible by 3 but not by 7.

3. Create a list of all squares of numbers between 1 and 1000 such that the square has last digit 1. (Hint: You obtain the last digit of a number as the remainder of dividing that number with 10.)

4. Create a dictionary with comprehension that associates the key \( i^2 \) with the value \( i^3 \) for \( i \in \{ 1,100 \} \).

5. Create the set of all numbers between 0 and 999 that simultaneously have remainder 1 when divided by 2, have remainder 2 when divided by 3, have remainder 3 when divided by 4 and have remainder 4 when divided by 5.

6. Create the set of all differences of two integers chosen in \{ 1,5,7,9,11,13 \}. This set contains 8 since 8 = 13-5 and it contains 4 since 4=11-7.
Solutions:

\[ [x \text{ for } x \text{ in } \text{range}(0, 101) \text{ if } x\%3] \]
(If \(x\%3\) is not zero, then it is true.)

\[ [x \text{ for } x \text{ in } \text{range}(0, 101) \text{ if } x\%7 \text{ and not } x\%3] \]

\[ [i**2 \text{ for } i \text{ in } \text{range}(1, 1001) \text{ if } i**2\%10==1] \]

\{i**2:i**3 \text{ for } i \text{ in } \text{range}(1,101)\}

\{x \text{ for } x \text{ in } \text{range}(1000) \text{ if } x\%2==1 \text{ and } x\%3==2 \text{ and } x\%4==3 \text{ and } x\%5==4\}

\text{a_set = \{1, 5, 6, 9, 11, 13\}}
\text{sorted({i-j \text{ for } i \text{ in } a\_set \text{ for } j \text{ in } a\_set})}

You do not need to use sorted of course, but the result is easier to digest with it.