

Workshop 3 – Exercises

Keith Numbers

A Keith Number is defined as any n -digit integer that appears in the sequence that starts off with the number's n digits and then continues such that each subsequent number is the sum of the preceding n . All one-digit numbers are trivially Keith numbers, but there are more interesting ones as well. For example, the number 7385 is a Keith number because of the following sequence:

7, 3, 8, 5, 23, 39, 75, 142, 279, 535, 1031, 1987, 3832, **7385**

Keith numbers are computationally hard to calculate; there are only about 100 known right now. Write a function `findKeithNumbers` that takes a minimum and maximum value and finds all Keith numbers between those values (inclusive). For each number, it should print the sequence that proves it is a Keith number. For example, if you call `findKeithNumbers(1, 1000)`, it should print:

```
1: {1}
2: {2}
3: {3}
4: {4}
5: {5}
6: {6}
7: {7}
8: {8}
9: {9}
14: {1, 4, 5, 9, 14}
19: {1, 9, 10, 19}
28: {2, 8, 10, 18, 28}
47: {4, 7, 11, 18, 29, 47}
61: {6, 1, 7, 8, 15, 23, 38, 61}
75: {7, 5, 12, 17, 29, 46, 75}
197: {1, 9, 7, 17, 33, 57, 107, 197}
742: {7, 4, 2, 13, 19, 34, 66, 119, 219, 404, 742}
```