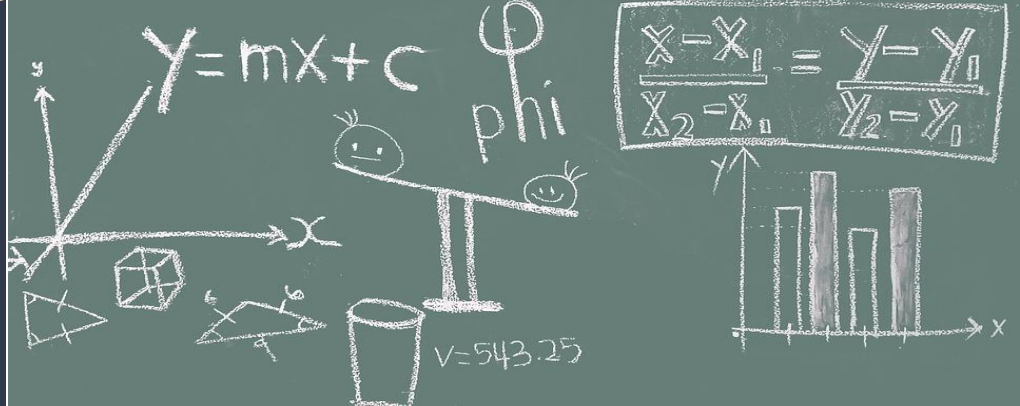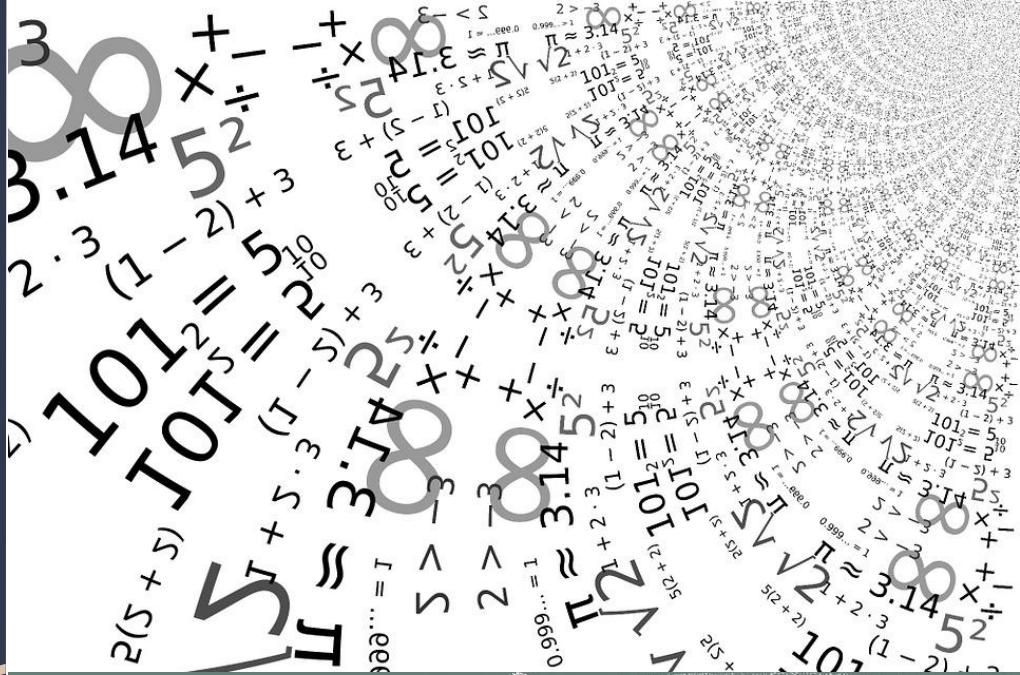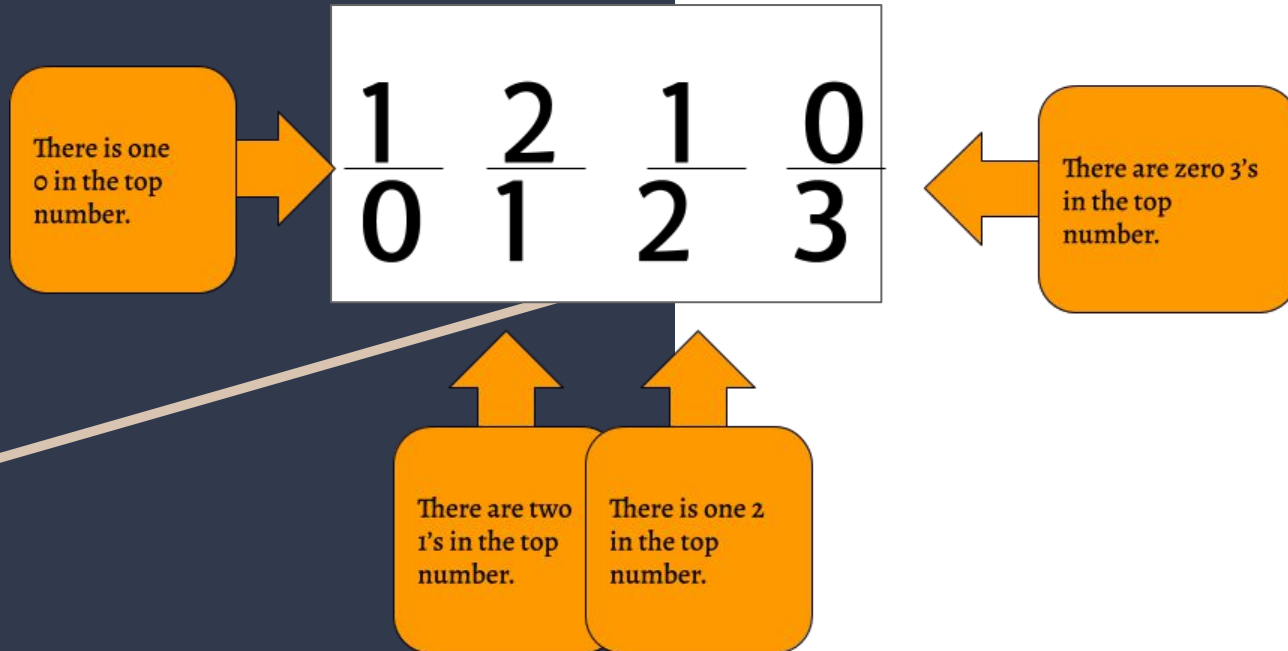# Autobiographical Numbers

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2019

What are autobiographical numbers?

- Autobiographical numbers are self descriptive

  ○ Each digit represents the number of the value of the digit below occurs.

  ○ The sum of the values of all of the digits is equal to the number of digits in the number.

Problem Statement

My challenge was to come up with all of the autobiographical numbers. The criteria for the numbers is difficult, so there were not many numbers to find.

$$\frac{1}{0} \quad \frac{2}{1} \quad \frac{1}{2} \quad \frac{0}{3}$$

There is one 0 in the top number.

There are zero 3's in the top number.

There are two 1's in the top number.

There is one 2 in the top number.

Results:

1210

2020

21200

3211000

42101000

521001000

6210001000

To find the low digit numbers I used trial and error. 1210, 2020, and 21200 were easy to find. I started with the first digit that contributes to the number of zeros. Next, I added the zero(s) at the end of the equation, and finally, used basic logic and reasoning to

Results (continued)

To find the high digit numbers, I found a pattern. All of the high digit numbers start with (x21.) X is equal to the number of digits, -4. For a 10 digit number case, x would equal 6. 6210001000 is a 10 digit autobiographical number, and it starts with x21. As well as 521001000, 42101000, and 3211000. The only difference between my strategy for finding low digit autobiographical numbers and high digit autobiographical numbers is the

Conclusion:

I completed my challenge by finding a pattern and learning new things as a work through the problem. I found all 7 autobiographical numbers, and interested myself into number sequences.
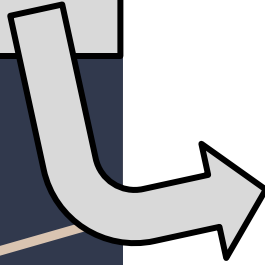
To make my challenge harder, I would find all autobiographical numbers in hexadecimal. Hexadecimal is a base 16 number system, unlike our base 10. This allows me to have large values like 15, into one digit. Hexadecimal is much more difficult because it is easy to confuse the two due to their similarities. Autobiographical numbers are an interesting, fun, and difficult number sequence.