RATS!

        RATS stands for Reverse Add Then Sort. It's an operation made up by John Conway, professor of math at Princeton University. The fun part is seeing what happens to different numbers as you do this operation over and over. (In math language, when we *iterate*.) Here's an example.

        Let's start with 157. First we reverse it to get 751. Then we add:

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 157
+751
 908
```

Then we sort the digits in 908 smallest first. We get 089. If there are zeros in front we discard them. So we end up with 89. Then we do it all again with 89:

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 89
+98
187
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We sort 187 to 178. So far the three numbers in our path, or sequence, or trajectory, are 157, 89, 178.

1) Try RATS starting with 9. Work neatly, and check your work with someone! What happens as you keep going? Write up what you notice!

2) This time start with 3,999. What happens?

3) Now use 2,079 as your seed. Do at least 13 iterations. What happens?

4) This time start with a nice small number, 3. Keep going! What do you notice?

5) Ready for a challenge? Try RATS starting with 1. Any surprises?

6) Up for a really big challenge? Start with the number 1,111,111. Does this number lead to a cycle? How long is the cycle?

7) Try RATS starting with numbers you choose. What happens? What do you notice about the sequences we get starting with different numbers? Do different numbers end up with the same destiny after a while? How many different destinies did you discover?

Have fun!