

Pre-Lecture Worksheet

Problems

Problem 1:

Find the smallest positive number such that if you move its last digit to the front (for example, turning 1234 into 4123), the new number is still a whole-number multiple of the original—and it's also larger than the original. Numbers should be written in regular decimal form with no leading zeros.

Problem 2:

Is there a power of 2 whose digits can be rearranged to form a different power of 2? For example, can you take one such number and shuffle its digits to get another number that is also a power of 2? All numbers should be written in standard decimal notation without any leading zeros.

Problem 3:

Is there a Fibonacci number that ends with exactly nine 9's in a row?

(The Fibonacci numbers are defined by the pattern: $F_1 = 1$, $F_2 = 1$, and every number after that is the sum of the two before it, so $F_n = F_{n-1} + F_{n-2}$ for $n > 2$.)

Problem 4:

Imagine a building with n floors and two magical eggs. These eggs will only break if you drop them from floor number b or higher. From any floor below that, they won't break at all. What is the fewest number of drops you need to figure out the exact value of b , no matter what it is?