Digits

Multiplicative persistence

Multiply *n*'s digits together to get a new number. Repeat until you get a single digit. The number of steps taken is called the *multiplicative persistence* of *n*.

e.g. 987 → 504 → 0. Multiplicative persistence = 2.

What's the smallest number with multiplicative persistence 3?
What's the multiplicative persistence of your birthday, in DDMMYYYY form?

Harshad numbers

18 is a Harshad number because the sum of its digits is 1 + 8 = 9, and 18 is divisible by 9.
19 is *not* a Harshad number because the sum of its digits is 1 + 9 = 10, and 19 is not divisible by 10.

What are the first 10 Harshad numbers?
Can you find three consecutive Harshad numbers?

Palindromes

A *palindrome* is a word that looks the same when read backwards or forwards.
12321 is a palindromic number.
How many 5-digit palindromic numbers are there?
How many *n*-digit palindromic numbers are there?