THE PALINDROME-NUMBER PROBLEM

Determining if a string is a palindrome

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THE PROBLEM

- Find the smallest positive integer that when squared produces
  - a palindrome
  - of at least 6 digits
  - that does not begin or end with a 0
- Work with numbers until the squaring operation is done, then convert the number to a string for testing
SOLUTION OUTLINE

• Generate a list of candidate numbers
• Square the number
• Convert the squared number to a string
• Use string operations to verify that the squared number satisfies the puzzle requirements
  • Squared number is at least six digits long
  • Squared number does not begin or end with a 0
  • The digits of the squared number form a palindrome
PALINDROME ALGORITHM 1

- Imagine the string written on a whiteboard
  - Short palindromes are easily spotted
  - Long palindromes require a systematic test
  - Copying or rewriting is undesirable
  - Keep testing as long as the characters match
• A matched characters do not establish a palindrome
• But mismatched characters do establish a non-palindrome
• A palindrome is established only if our fingers meet in the center of the string
PALINDROME ALGORITHM 2

\[
\begin{array}{cccccc}
\text{s} & a & x & c & d & c & y & a \\
\text{r} & a & x & c & d & c & y & a \\
\text{r} & a & y & c & d & c & x & a
\end{array}
\]

reverse

copy
Start

number = 1

square = number * number

number = number + 1

s = string(number)

length(s) < 6?

does s begin or end with 0?

is s a palindrome?

End

print number