What are the last two digits of $99^{1787416}$?

- Consider the equation modulo 100
- $99 \equiv (-1) \pmod{100}$
- $99^k \equiv (-1)^k \pmod{100}$
- So the last two digits are

$$\begin{cases} 99, & k \text{ odd,} \\ 01 & k \text{ even.} \end{cases}$$