$$
\begin{aligned}
7^{7\times7\times7} &\equiv (-3)^{7\times7\times7} \pmod{10} && && (1)\\
&\equiv 9^{7\times7\times7-2} \pmod{10} && && (2)\\
&\equiv (-1)^{7\times7\times7-2} \pmod{10} && && (3)\\
&\equiv -1 \pmod{10} && \text{since } 7\times7\times7 \text{ is odd } (\because 7 \text{ is odd}) && (4)\\
& && \text{and hence in the form } 2k+1 \ \exists\ k \in \mathbb{Z}. && (5)\\
& && \text{Thus, } 7\times7\times7-2 \text{ is also odd,} && (6)\\
& && \text{since } 2k+1-2 = 2(k-1)+1 \text{ is odd.} && (7)\\
&\equiv 9 \pmod{10} && && (8)
\end{aligned}
$$