Modular Arithmetic Practice

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Evaluate the following expressions.

1. $123 \pmod{15}$
2. $216 \pmod{11}$
3. $1620 \pmod{8}$
4. $3240 \pmod{7}$
5. $5555 \pmod{6}$
6. $10^{10} \pmod{9}$

Solve for all values of x.

7. $\begin{cases} x - 1 & \equiv 1 \pmod{4} \\ 5x & \equiv 6 \pmod{7} \\ x^2 + 1 & \equiv 4 \pmod{11} \end{cases}$
8. Compute $48^{24} \pmod{25}$
9. For what values of x are the last digit of x^2 and x^3 the same?
10. What are the last three digits of $1357^{33^{84}}$?