

PQ 7

2

$$\begin{cases} x \equiv 88 \pmod{6} \\ x \equiv 100 \pmod{15} \end{cases} \iff \begin{cases} x \equiv 1 \pmod{3} \\ x \equiv 0 \pmod{10} \end{cases}$$

Let $x = 10t$. Then $10t - 3k = 1$, yielding $t = 1 + 3j$. Therefore $x = 10 + 30j$, or

$$x \equiv 10 \pmod{30}.$$

3

$$\begin{cases} 2x \equiv 1 \pmod{5} \\ 3x \equiv 9 \pmod{6} \\ 4x \equiv 1 \pmod{7} \end{cases} \iff \begin{cases} x \equiv 3 \pmod{10} \\ x \equiv 2 \pmod{7} \end{cases}$$

Let $x = 3 + 10t$. Then $5t - k = 2$, yielding $t = 2 + 7j$. Therefore $x = 23 + 70j$, or

$$x \equiv 23 \pmod{70}.$$

4

$$\begin{cases} x \equiv 2 \pmod{5} \\ x \equiv 4 \pmod{7} \\ x \equiv 1 \pmod{9} \end{cases}$$

Let $x = 2 + 5t$. Then $5t - 7k = -2$, yielding $t = -1 + 7j$. Therefore $x = -3 + 35j$. So $j = -4 + 9n$, giving $x = 172 + 315n$, or

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$$x \equiv 172 \pmod{315}.$$

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$$\begin{aligned} x &\equiv 172 \pmod{315}. \\ x &\equiv 172 \pmod{315}. \end{aligned}$$

6

a

$$210^{-1} \equiv 2^{-1} \equiv 7 \pmod{13}.$$

b

c

$$x \equiv 8 \cdot 210^{-1} \equiv 8 \cdot 7 \equiv 56 \equiv 4 \pmod{13}.$$

7

a

$$41^{-1} \equiv 161 \pmod{660}.$$

b

$$x \equiv 125 \cdot 161 \equiv 325 \pmod{660}.$$