1. Solve the simultaneous congruences

\[ x \equiv 3 \pmod{6} \]
\[ x \equiv 5 \pmod{35} \]
\[ x \equiv 7 \pmod{143} \]
\[ x \equiv 11 \pmod{323} \]

2. Eggs in basket problem (India 7c.). Find the smallest number of eggs such that when eggs are removed 2, 3, 4, 5 or 6 at a time 1 remains, but when eggs are removed 7 at a time none remain.

3. Find all solutions (if there are any) to each of the following congruences
   (i) \[ x^2 \equiv -1 \pmod{7} \], (ii) \[ x^2 \equiv -1 \pmod{13} \], (iii) \[ x^5 + 4x \equiv 0 \pmod{5} \].