If $(p_1, p_2 \ldots, p_n)$ are prime numbers then for every integers $(a_1, a_2, \ldots, a_n)$ there exists N such that $N \equiv a_i (mod\, p_i)$, $(i = 1, 2, \ldots n)$. This is famous Chinese residual Theorem.

If $(x_1, x_2, \ldots x_n)$ are n points on the line $\mathbf{R}$ then for every real numbers $(y_1, y_2, \ldots, y_n)$ there exists polynomial $P(x)$ such that $P(x_i) = y_i$, $(i = 1, \ldots, n)$. In fact one can choose unique polynomial of order $\leq n$ obeying these conditions. This polynomial is:

$$P(x) = \sum_{i=1}^{n} \frac{\prod_{m \neq i}(x - x_m)}{\prod_{m \neq i}(x_i - x_m)} y_i$$

(We suppose that the points $x_1, \ldots, x_n$ are distinct)

E.g. for sets (x_1, x_2, x_3) and (y_1, y_2, y_3)

$$P(x) = \frac{(x - x_2)(x - x_3)}{(x_1 - x_2)(x_1 - x_3)} y_1 + \frac{(x - x_1)(x - x_3)}{(x_2 - x_1)(x_2 - x_3)} y_2 \frac{(x - x_1)(x - x_2)}{(x_3 - x_1)(x_3 - x_2)} y_3$$

(we suppose that x_1, x_2, x_3 are distinct points

what happens if they are not dinstinct?)

One can see the striking resemblance between these two formulae considering the following idea which revolutionased the mathematics of XX century. A commutative algebra (ring) can be considered as algebra (ring)of functions on some set. An arbitrary integer N can be considered as a function on prime numbers with values in reminders. Using this idea one can see the striking resemblance between the Chinese formula and Lagrange polynomial approximation formula

In the same way we can write:

Let N be ionteger. We consider a function $N(p_i) =$ remainder when divided on p_i For example the number $N = 124$ defines a function

$$N(2) = 0\,(mod\, 2)\,, \quad N(3) = 1\,(mod\, 3)\,, N(5) = 4\,(mod\, 5)\,, N(7) = 5\,(mod\, 7)\,, N(11) = 3\,(mod\, 7)\,,$$