

$$\gcd(710, 310) = 10$$

Extended Euclid alg finds x, y to give linear combination

$$\boxed{x \cdot 710 + y \cdot 310 = 10}$$

Start at the bottom

$$\begin{aligned} \boxed{10} &= 90 - 2 \cdot 40 \\ &= 90 - 2 \cdot (310 - 3 \cdot 90) \\ &= 7 \cdot 90 - 2 \cdot 310 \\ &= 7 \cdot (710 - 2 \cdot 310) - 2 \cdot 310 \\ &= \boxed{-16 \cdot 310 + 7 \cdot 710} \end{aligned}$$

Mult. inverses

$$\text{when } \gcd(a, n) = 1$$

$$x \cdot a + y \cdot n = 1$$

notice that

$$x \cdot a = -y \cdot n + 1$$

which says $x \cdot a \equiv 1 \pmod{n}$

i.e. $x = a^{-1} \pmod{n}$.

`mygcdex(a, 0)`

$\rightarrow (1, 0, a)$

x, y, d

$$a = \underline{\hspace{1cm}} \times a + \underline{\hspace{1cm}} \times 0$$