2) Extended Euclidean

a) $754x + 233y = 1$

$754 = 3 \times 233 + 55$

$233 = 4 \times 55 + 13$

$55 = 4 \times 13 + 3$

$13 = 4 \times 3 + 1 \Rightarrow \gcd(754, 233) = 1$

$3 = 3 \times 1 + 0$

$\Rightarrow 1 = 13 - 4(55 - 4(13))$

$1 = 13 - 4(55) + 16(13)$

$1 = 17(13) - 4(55)$

$1 = 17(233 - 4(55)) - 4(55)$

$1 = 17(233) - 68(55) - 4(55)$

$1 = 17(233) - 72(55)$

$1 = 17(233) - 72(754 - 3(233))$

$1 = 17(233) - 72(754) + 216(233)$

$1 = 233(233) - 72(754)$

$x = -72 \quad y = 233$

b)

$754^{-1} \bmod 233 = 161$

$233^{-1} \bmod 754 = 233$

$754^{-1} \bmod 233$ exists such that

$754x = 1 \pmod{233}$

$\Rightarrow ax + my = 1$

$-72 \pmod{233} = 161 \pmod{233}$

$\Rightarrow 754^{-1} \bmod 233 = 161 \bmod 233$

$233^{-1} \pmod{754}$ exists such that

$233x = 1 \pmod{754}$

$\Rightarrow ax + my = 1$

$\Rightarrow 233^{-1} \bmod (754) = 233 \pmod{754}$