

Extended Euclidean algorithm

previously: $\gcd(30, 108) = 6$

now: find r, s so that $6 = 30 \cdot r + 108 \cdot s$

$\gcd(a, b) = a \cdot r + b \cdot s$
Bezout's identity

$$108 = 4 \cdot 30 - 12$$

$$30 = 2 \cdot 12 + 6$$

$$12 = 2 \cdot 6 + 0$$

rewrite:

$$12 = -1 \cdot 108 + 4 \cdot 30$$

$$6 = 1 \cdot 30 - 2 \cdot 12$$

$$= 1 \cdot 30 - 2 \cdot (-1 \cdot 108 + 4 \cdot 30)$$

$$= 1 \cdot 30 + 2 \cdot 108 - 8 \cdot 30$$

$$6 = -7 \cdot 30 + 2 \cdot 108$$

r

s