

## How to Solve $mx + ny + kz = c$

**Step 1:** Fix one variable (say  $z$ ) and re-write the equation as

$$(1) \quad mx + ny = c - kz.$$

Use the GCD-criterion to derive from (1) an auxiliary equation in  $z$  and  $w$  of the form

$$(2) \quad kz + gw = c,$$

in which  $g = \gcd(m, n)$ .

**Step 2:** Solve the auxiliary equation (2) to get an expression for  $z$  in terms of a parameter  $t$ .

**Step 3:** Substitute this expression for  $z$  in the original equation and solve for  $x$  and  $y$ , treating  $t$  as fixed. (Introduce a new parameter  $s$  here.)

**Step 4:** Collect the equations for  $x, y$  and  $z$  together.

**Step 5:** If applicable, analyze the constraints on  $x, y$  and  $z$ .