- If **D** ≠

  If **F** is multiple of **g** we can divide all three coefficients by **g** thus obtaining: **dx + ey = -f** (where **d=D/g**, **e=E/g** and **f=F/g**). We will use now the Extended Euclid's Algorithm that can be used to find integers **u'** and **v'** such that **uu'+vv' = ±gcd(u, v)**(where the sign depends on the sign of **d** and **e** and the exact implementation of the algorithm).

  We can let **u = d**, **v = e**. Once the values of **u'** and **v'** are found so that **du'+ev' = ±1**(since **gcd(d, e)=1**) we can multiply the equation by **-f** to obtain:

  du'+ev' = ±1 => d(±fu')+e(±fv') = -f => d(±fu')+det+e(±fv')-det = -f => d(et±fu')+e(-dt±fv') = f

  So the general solution set is:

x = et ± fu'
y = -dt ± fv'
t = any integer

Example 1: Solve **10x + 84y + 16 = 0**.

gcd(D, E) = gcd(10, 84) = 2. Since the constant term is also multiple of 2, we will divide the equation by this **gcd**.

The equation is now: **5x + 42y + 8 = 0**.

Now we must apply the Generalized Euclidean algorithm:

- Step 1: 1 * 5 + 0 * 42 = 5
- Step 2: 0 * 5 + 1 * 42 = 42
- Step 3: 1 * 5 + 0 * 42 = 5
- Step 4: (-8) * 5 + 1 * 42 = 2
- Step 5: 17 * 5 + (-2) * 42 = 1

Multiplying the last equation by **-F = -8** we obtain:
(-136) * 5 + 16 * 42 = -8

Adding and subtracting **de t = 5 * 42 t** we obtain:
(-136 + 42 t) * 5 + (16 - 5 t) * 42 = -8

So, the solution is given by the set:

x = -136 + 42 t
y = 16 - 5 t