

## List 2 of Problems

1. For each of the following pair of numbers, express  $\gcd(a, b)$  as a linear combination of  $a$  and  $b$ .

a)  $a = 16, b = 135$

b)  $a = 55, b = 34$

c)  $a = 107, b = 23$

2. Determine whether the following equations have solution and in case they do, find all of them.

$$(1) \quad 42x + 312y = 834, \qquad (2) \quad 144x + 702y = 9$$

3. To lay a 122 m. section of track, 30 m. and 16 m. long bars are available. Is it possible to cover the section using only these types of bars? If it is possible, determine how many bars of each length are needed to cover the 122m.

4. We send by mail two types of packages A and B. We are charged 15 euro cents more for sending type A than type B parcels. Knowing that we have sent more packages of type B than of type A, that in total we have sent 12 packages and that we have been charged a total of 13 euros and 20 cents, how many of each type have we sent and what have we been charged for each one?

5. (Maxima) Solve the Diophantine equation  $4x + 6y + 7z = 12$  following the procedure described below:

a) Use the change of variable  $u = 2x + 3y$  and solve (using Maxima), the resulting equation with  $u$  and  $z$  as unknowns.

b) For any solution  $u$  obtained in the previous section, solve with the help of Maxima, the Diophantine equation  $2x + 3y = u$  in  $x$  and  $y$ .

c) Reason the possibility of using the above steps to solve any equation with 3 or more unknowns; what other changes of variable could we have used?