MTH26001 Quiz 1

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1. $123x + 360y = 99$

   $3 * 41x + 5 * 2^3 * 3^2 y = 11 * 3^2$

   $41x + 120y = 33$

   $x = (33 - 120y)/41 = (33 + 3y)/41 - 3y = 3 * (11 + y)/41 - 3y$

   $11 + y \equiv \pmod{41}$

   $y \equiv -11 \pmod{41}$

   Thus, all solutions for $y = 41k - 11$

   and all solutions for $x = 3(11 + y)/41 - 3y = (33 + 123k - 33)/41 - 123k + 33 = 33 - 123k$.

2. By Wilson's Reflection formula we got:

   $(p - 1 - k)! \equiv (-1)^{k+1}/k! \pmod{p}$ when p is prime.

   In our case $p = 19, k = 1$, so $(-1)^{k+1}/k! = (-1)^2/1! = 1$.