

$$\begin{aligned}
a &= qk + r \quad 0 \leq r < a & (1) \\
a &= qk' + r' \quad 0 \leq r' < a & (2) \\
qk + r &= qk' + r' & (3) \\
q(k - k') + (r - r') &= 0 & (4) \\
r' &= r + p \quad p \in Z & (5) \\
0 &\leq r' < a & (6) \\
0 &\leq r + p < a & (7) \\
-p &\leq r < a - p & (8) \\
p &= 0 & (9) \\
r' &= r & (10) \\
q(k - k') + (r - r') &= 0 & (11) \\
q(k - k') + (r - r) &= 0 & (12) \\
q(k - k') + 0 &= 0 & (13) \\
q(k - k') &= 0 & (14) \\
k - k' &= 0 & (15) \\
k' &= k & (16)
\end{aligned}$$