

Number Theory (C)

Proof

prove:

Prove that if $m =_{(n)} m'$ and $p =_{(n)} p'$ then $m * p =_{(n)} m' * p'$.

proof

Let $m = k_1 * n + m'$ and $p = k_2 * n + p'$,

Therefore,

$$\begin{aligned} m * p &= (k_1 * n + m') * (k_2 * n + p') \\ &= k_1 * k_2 * n^2 + k_1 * p' * n + k_2 * m' * n + m' * p' \\ &= (k_1 * k_2 * n + k_1 * p' + k_2 * m') * n + m' * p' \end{aligned}$$

Let $k_1 * k_2 * n + k_1 * p' + k_2 * m' = k$, so $m * p = k * n + m' * p'$.

Therefore, $m * p =_{(n)} m' * p'$.