

Proof HW

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Theorem.

If $i/j \equiv n/m$ and $k/l \equiv p/q$ then $i/j \oplus k/l \equiv n/m \oplus p/q$.

Proof.

Suppose $i/j \equiv n/m$ and $k/l \equiv p/q$. By definition $im = nj$ and $qk = pl$. Note that $i/j \oplus k/l = (il + kj)/(jl)$. Note that $n/m \oplus p/q = (nq + pm)/(mq)$. Note that $mq(il + kj) = mqil + mqkj = (mi)ql + (qk)mj = (nj)ql + (pl)mj = jl(nq + pm)$ and thus $(il + kj)/(jl) \equiv (nq + pm)/(mq) \Rightarrow i/j \oplus k/l \equiv n/m \oplus p/q$.

□