

Name _____

Quiz #13
Mathematics 309a Abstract Algebra
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Define a function $\phi: Z_3 \times Z_3 \times Z_3 \rightarrow Z_3 \times Z_3$ by $\phi(a, b, c) = (a - b, a - c)$

A. Prove that ϕ is a homomorphism.

B. Prove that ϕ is onto.

C. Determine $\ker \phi$, the kernel of ϕ .

D. Use the Fundamental Theorem of Homomorphisms to determine the structure of $Z_3 \times Z_3 \times Z_3 / \langle (1, 1, 1) \rangle$.