

1. Let G be a group of permutations. For each $\sigma \in G$, define

$$\text{sgn}(\sigma) = \begin{cases} +1 & \text{if } \sigma \text{ is an even permutation,} \\ -1 & \text{if } \sigma \text{ is an odd permutation.} \end{cases}$$

Prove that sgn is a homomorphism from G to the multiplicative group $\{+1, -1\}$. What is the kernel?

2. Find the kernel of the homomorphism $p : G \oplus H \rightarrow G$ by $p(g, h) = g$.

November 17, 2004