

Abstract Algebra Summary

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1 The System of Natural Number

1.1 Product Set

Definition 1.1. The product set $S \times T$ of two arbitrary sets S and T is a set of pairs (s, t) , $s \in S, t \in T$. In general $\prod S_i = S_1 \times S_2 \times \cdots \times S_r$ is the collection of r -tuples (s_1, s_2, \cdots, s_r) , where $s_i \in S_i$. If (s_1, s_2, \cdots, s_r) and $(s'_1, s'_2, \cdots, s'_r)$ are equal, we have $s_1 = s'_1, s_2 = s'_2, \cdots, s_r = s'_r$.

1.2 Mapping

Definition 1.2. A mapping α of set S onto set T if $\forall t \in T, \exists s \in S \Rightarrow \alpha(s) = t$, we also write the image of s in T as $s\alpha$ or s^α . The image set of S is denoted as $S\alpha$ or S^α .

If α is a one-to-one mapping, s is unique for every t , and we call an inverse mapping α^{-1} which is one-to-one of T onto S .

Definition 1.3. Resultant or Product of mapping is denoted as $\alpha\beta$, where α maps set S onto set T and β maps set T onto set U . Mapping of S onto U can be written as $S(\alpha\beta) = (S\alpha)\beta$, and same for each element.

Theorem 1.1. *content...*

2 Groups

3 Rings

4 Fields