COMP2711H Tutorial 4

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1 Bijection Principle

Theorem 1.1. Let A and B be two sets. If there is a bijection from A to B, then $|A| = |B|$.

Exercise 1.1. Let A be any nonempty set. Prove that the number of odd-size subset of A is equal to the number of the even-size subsets of A.

Exercise 1.2. How many nonnegative integer solution does $x_1 + x_2 + x_3 = 13$ have?

2 Mapping rules

Theorem 2.1. Let A and B be two sets. If there is a mapping $f : A \to B$ where each element $a \in A$ is related to exactly one element $b \in B$ and each element $b \in B$ is related to m elements in A, then $|A| = m|B|$.

Exercise 2.1. How many ways can we choose k elements from n elements?

Exercise 2.2. Let A and B be two sets. If there is a mapping $f : A \to B$ where each element $a \in A$ is related to exactly n element $b \in B$ and each element $b \in B$ is related to m elements in A, then $?|A| = ?|B|$.

References

[1] M. Lehman, Leighton. *Mathematics for Computer Science*, chapter 14. 2013.