Introduction to Probability and Statistics for Engineers and Scientists

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1 Combinatorics (Section 1.2.3 Cardinality)

1.1 Counting Methods

A way to efficiently count the amount of elements in a set; most of what the counting method is based on is the multiplication principle.

1.1.1 Example 2.1

Suppose that I want to purchase a tablet computer. I can choose either a large or a small screen; a 64GB, 128GB, or 256GB storage capacity, and a black or white cover. How many different options do I have?
There are 12 possible options; the multiplication principle states that we can multiply 2 x 3 x2 = 12

1.1.2 Theorem 1.3

Any subset of a countable set is countable. Any super-set of an uncountable set is uncountable.

1.1.3 Theorem 1.4

If $A1, A2...$ is a list of countable sets, then the set $\cup_i A_i = A1 \cup A2 \cup A3...$ is also countable.

1.1.4 Theorem 1.5

If A and B are countable, then AxB is also countable.