Notes on *A Mathematics Course for Political and Social Research*

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1 Citation

This is a note for
A Mathematics Course for Political and Social Research by Will H.Moore and David A.Siegel.

2 Keywords

Calculus; Probability; Linear Algebra

3 Commentary

- This note is created by Enbang Wu at the University of Wisconsin-madison for the UWM political science graduate math camp 22-23.
- This note is mainly to clarify some important concepts and make it easier for readers.
- The range of this note is from Chapter 1 through Chapter 13. And not all of the chapters are covered, but you can contribute to the missing part.
- This note is an open source project under the MIT license and welcome any contribution!

4 Contribution

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5 Chapter 1 Preliminaries Math

In this chapter, it introduces some of the most fundamental math concepts. To better understand them, we will provide some metaphors.

5.1 Sets:

- Countable sets: A countable set compromises discrete elements. You can think of it like there is a hole or distance among the elements, no matter how close they are.
- Uncountable sets: A uncountable set compromises continues elements. In mathematical language, no matter how small a distance is given, I can always find elements that fit in.

Countable sets and uncountable sets are important because you will find that they share a similar idea with calculus and calculus-based probability.

6 Chapter 3 Functions, Relations and Utility

6.1 Difference between functions and equations

Functions and equations are both widely used in our life but they are different. A function is a **relation** that associate the input to the output. A equation is a **statement** that two expressions are equal.An function can often be written as equation, but not every equation is a function.

6.2 Nonlinear Functions: Exponents, Logarithms, and Radicals

In this part, you should take extra attentions to the rules of nonlinear functions because they are different than what you have learner before.
For exponents:

- Multiplication: $x^m \times x^n = x^{m+n}$
- Division: $x^m \div x^n = x^{m-n}$

For logarithms: Logarithms can be thought as the inverse of exponents. The logarithm of x^m is $m \log(x)$.
For radicals: Roots are those are those numbers represented by the radical symbol.

- $x^m \sqrt{x^n} = x^{m/n}$
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