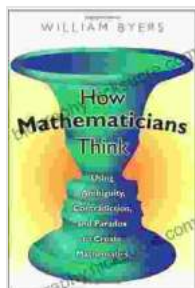


Using Ambiguity, Contradiction, and Paradox to Create Mathematics



How Mathematicians Think: Using Ambiguity, Contradiction, and Paradox to Create Mathematics

by William Byers

★★★★☆ 4.3 out of 5

Language : English

File size : 3163 KB

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Screen Reader : Supported

Enhanced typesetting : Enabled

Print length : 425 pages

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Mathematics is often thought of as a precise and logical subject, but it is also full of ambiguity, contradiction, and paradox. These concepts have played a vital role in the development of mathematics, and they continue to challenge and inspire mathematicians today.

Ambiguity

Ambiguity is the presence of two or more possible interpretations of a statement or concept. This can be a source of confusion and frustration, but it can also be a creative force in mathematics.

For example, the statement " x is greater than y " is ambiguous because it does not specify what is meant by "greater than." This ambiguity can be

used to create new mathematical ideas, such as the concept of a partial order.

Another example of ambiguity in mathematics is the concept of infinity. Infinity is often defined as "the unbounded," but this definition is itself ambiguous. What does it mean for something to be unbounded? This question has led to a number of different theories of infinity, each of which has its own advantages and disadvantages.

Contradiction

A contradiction is a statement that is both true and false. This may seem impossible, but it is actually quite common in mathematics.

For example, the statement "this statement is false" is a contradiction. If the statement is true, then it must be false. But if the statement is false, then it must be true. This contradiction can be used to prove a number of important mathematical theorems, such as the law of excluded middle.

Another example of contradiction in mathematics is the concept of a null set. A null set is a set that contains no elements. But if a set contains no elements, then it is not a set. This contradiction has led to a number of different theories of sets, each of which has its own advantages and disadvantages.

Paradox

A paradox is a statement that seems to be true but actually leads to a contradiction. This can be a very confusing and frustrating experience, but it can also be a source of great insight.

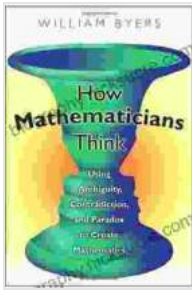
For example, the statement "the liar paradox" is a paradox. The liar paradox states that "this statement is false." If the statement is true, then it must be false. But if the statement is false, then it must be true. This paradox has led to a number of different theories of truth, each of which has its own advantages and disadvantages.

Another example of a paradox in mathematics is the Banach-Tarski paradox. The Banach-Tarski paradox states that it is possible to take a solid ball and cut it into a finite number of pieces and then reassemble the pieces into two balls of the same size as the original ball. This paradox has led to a number of different theories of measure, each of which has its own advantages and disadvantages.

Ambiguity, contradiction, and paradox are all essential parts of mathematics. These concepts have played a vital role in the development of mathematics, and they continue to challenge and inspire mathematicians today.

If you are interested in learning more about the role of ambiguity, contradiction, and paradox in mathematics, I encourage you to read some of the following books:

- Gödel, Escher, Bach: An Eternal Golden Braid by Douglas Hofstadter
- The Liar Paradox and Other Inquiries into Logic and Information by Paul Teller
- Paradoxes in Mathematics, Logic, and Computer Science by Akihiro Kanamori

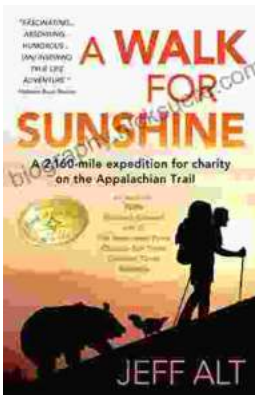


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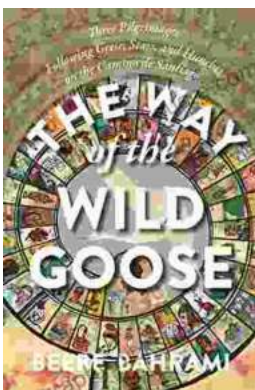
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