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THE ANTI-EXISTENCE THEOREM

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ABSTRACT: *An element of a set that possesses the property of anti-existence may be described by a negative integer*.

KEYWORDS: Addition, Annihilation, Anti-Existence, Coordinate System, Counting Function, Element, Intersection, Mirror Image, Natural Numbers, Partition, Set, Subtraction, Symmetry, Union.

INTRODUCTION

The idea of anti-existence may be introduced as an element of a set that possesses a trait or characteristic that is opposite to a regular element but is otherwise highly symmetrical to it, forming a mirror image that when added or combined with the regular element to which it is symmetric, results in a sum that is annihilated.

The idea of anti-existence recognizes the inherent symmetry between the set of natural numbers and set of negative integers, which form a mirror image of each other, where the sum of a natural number with its mirror image in the set of negative integers results in zero, or the numeric value of the empty set.

The set of natural numbers is usually first introduced to count or enumerate the objects or elements in a set, which are whole and discrete. Fractions of the natural numbers are then introduced to count objects or elements that are not whole, but partial and still discrete, as a fraction of an object or element.

To count or measure objects or elements that are not whole, and are not accurately represented by a fraction, the irrational numbers are introduced. These numbers express either the result of algorithms such as the square root of two, or numbers that commonly appear in nature, and are not able to be expressed using the natural numbers, such as the ratio of the circumference of a circle to its diameter, which is usually written as π.

Irrational numbers such as the square root of two or π are often left expressed in algebraic terms or symbols as their numeric expression as a decimal frequently involves a series of computations that may add precision but do not reach an end, although conclusions are often reached about their value within a given level of precision.

Where counting enumerates objects or elements in a set, reverse counting enumerates a decrease in the number of objects or elements in a set, whether by deletion or transfer. In a sense, reverse counting reflects the idea of anti-existence as it reverses the existence of an object or element as a member of a set, at least as it is counted.

Counting and reverse counting also occur in coordinate systems, which use numbers to count or measure displacement in a uniform or consistent direction, typically on a straight line. A coordinate system establishes direction based on its point of origin, and a duality such as left or right, backwards or forwards, or up or down, which it then labels as positive or negative.

A coordinate system uses an axis line to count or measure displacement, which typically represents a dimension or unit of measurement. Coordinate systems that use two or more dimensions will usually place the point of origin at the intersection of the axis lines that define its dimensions or units of measurement.

For example, the Cartesian system of (x, y) coordinates identifies a point or object in a plane by counting its displacement along a horizontal x axis and a vertical y axis, using a point of origin of (0, 0), which represents the intersection of the x axis and y axis at a ninety degree angle.

Coordinate systems are often used in analytic geometry, and to graph functions of the form y = f (x), where y is expressed in terms of x. Functions of the form y = f(x) are used widely in science and engineering since they are effective at expressing cause and effect relationships and natural laws such as the law of gravity, or Einstein's famous equation that equates energy with mass times the speed of light squared.

Functions of the form y = f(x) often use different types of mathematical formulas such as a linear equation, a quadratic equation, or an inverse square relationship, which is able to express forces such as gravity or radiation over distance. Other common formulas use exponents, logarithms, or sine and cosine.

Mathematically speaking, a function f creates a map of elements from a set called the domain into a set called the range. It takes a single element from the domain and relates it to a single element in the range, in a one to one correspondence.

Coordinate systems are commonly used to depict vectors like arrows, which are defined by a magnitude and direction, and often represent lines of force. Forces that are equal in magnitude but opposite in direction may cancel each other out, or represent a point of balance or equilibrium.

Another type of anti-existence is found with anti-matter such as the anti-proton, which is highly symmetrical to a proton, at least in most respects, but when brought together in close physical proximity results in their mutual annihilation, with a release of energy.

In set theory, an element that possesses the property of anti-existence may be viewed as a type of anti-matter, highly symmetrical compared to a regular element, at least in terms of possessing most of the traits and characteristics that define the set, but when added or combined with a regular element, results in their mutual annihilation.

In set theory, elements that possess the property of anti-existence may annihilate or destroy other elements, since the result of their addition or combination results in the null or empty set. In a sense, annihilation transfers the result or sum out of the set universe, into another universe.

The Anti-Existence Theorem states that when a positive or natural number is used to count or describe an object or element in a set, the anti-existence of the object or element may be inferred by using a different type of number, such as a negative integer, to describe an element with the property of anti-existence.

With this in mind, the set of negative integers may be viewed as possessing the property of anti-existence compared to the set of natural numbers since, as their mirror image, the addition

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of a negative integer with its mirror image natural number results in a sum of zero, or the numeric value of the empty set.

The mirror image nature of the negative integers compared to the natural numbers is reflected in how a negative integer may be paired with a mirror image natural number, at least as determined by their spacing or count from zero, as the point of origin for the number line.

In a sense, anti-existence involves three distinct sets. The first set consists of elements that represent a state of existence, as depicted by the set of natural numbers. The second set consists of elements that form a mirror image of the first set, which possess the property of anti-existence, as depicted by the set of negative integers.

The third set consists of a single element, zero, which represents the empty set, and serves as a transfer point for their sum that is annihilated out of a state of existence and anti-existence into a state of non-existence.

Regarding the use of the set of natural numbers and negative integers to represent a state of existence and anti-existence, their elements possesses the same elemental composition, as represented by their uniform spacing on a number line, so that the elements in the two sets are highly symmetrical. But compared to the natural numbers, the negative integers possess an opposite or reverse orientation, which is determined by the direction of their spacing or count from zero.

While the set of natural numbers is commonly lumped together with the set of negative integers and zero, and all three are called the set of integers for their uniform spacing on the number line, the three sets arguably represent different types of elements, distinct from each other.

Closely related to the idea of anti-existence is how the set of negative integers, which have a reverse orientation compared to the set of natural numbers, may be viewed as representing a change in direction of the counting function, or the idea of reverse counting.

The Counting Function

The counting function enumerates the elements of a set, which are generally assumed to be countable since they are distinct, meaning they are able to be identified as elements so that they may be grouped together in a set, according to a common trait or characteristic that they share in common.

Set theory is based on the identification and classification of elements. It uses the positive input of recognizing and identifying an object or element to determine whether it has a common trait or characteristic as a member of a set.

Set theory typically uses a schematic diagram to separate objects or elements into sets. Called a Venn Diagram, this schematic assumes that the boundary of a set is able to be clearly defined, and typically uses a circle to depict a set within a universe that is represented by an enclosed box.

Set theory recognizes how a set may be partitioned into two or more smaller sets, called subsets. Subsets play an important role in schemes of scientific classification such as the classification of biological organisms into kingdoms and species, or stars into main sequence stars, various types of dwarfs, and neutron stars and black holes.

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A partition usually divides all the elements of a set into two or more subsets based on some refinement in their classification, or a common numeric division, which divides a set numerically into subsets of a uniform size or quantity.

Partitions may refine the classification of their elements according to their time or order of occurrence, or other variable, similar to how accountants often sort a list of expenses according to their order of occurrence, using either the first in first out (FIFO) or last in last out (LIFO) method.

Set theory recognizes how two sets may be joined together in a union, which combines their elements into a larger set. While a union between two sets changes their boundary line so it encloses the elements of both sets, as a rule it does not double count the same elements. The union of two sets A and B is often written as A U B.

Set theory also recognizes how two sets may share an intersection, which consists of the elements they share in common. The intersection of two sets changes their boundary line so that it encloses only elements found within both sets, but, like a union, does not double count the same elements. The intersection between two sets A and B is often written as $A \cap B$.

Intersections between sets often occur because of the different schemes and levels that are used to classify elements, and the shades of variation that may occur among different types of elements. Sets that do not share any elements in common are called disjoint, although they may share a common boundary.

Set theory also recognizes the complement of a set, which consists of the elements that lie outside the set. The complement of a set is often written using an overhead line over the name of the set, or an upper mark.

To count the number of elements in a set, a counting function, called N, may be introduced. If A and B are two sets, N (A) represents the number of elements in set A, and N (B) represents the number of elements in set B.

To count the number of elements in the two sets, the usual rules of arithmetic would add the number of elements in sets A and B to arrive at a total that equals N (A) + N (B). Set theory applies the counting function differently, to their union to avoid double counting elements in their intersection. With this in mind, a counting theorem may be offered.

Counting Theorem

According to the counting theorem of set theory, the number of elements in the union of set A with set B is equal to the number of elements in set A plus the number of elements in set B, less the number of elements in their intersection. Algebraically, this may be written as:

$N (A \cup B) = N (A) + N (B) – N (A \cap B)$

(Venn Diagram example showing sets A and B sharing a non-trivial intersection, and displaying a count of the sets, perhaps where N (A) = 10, N (B) = 5, and $N (A \cap B) = 3$, so that N (A U B) = 12.)

This expression may be simplified when the sets are disjoint or subsets of each other.

When the two sets are disjoint:

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N (A U B) = N (A) + N (B) – N (A ∩ B) =

N (A) + N (B) – N {} = N (A) + N (B) – 0 = N (A) + N (B)

(Venn Diagram showing sets A and B as disjoint, no numerical example)

When one of the sets is a subset of the other:

N (A U B) = N (A) or N (B), depending on which set is subset of the other.

If set A is a subset of set B, N (A U B) = N (B)

(Venn Diagram showing set A as a subset of set B, no numerical example)

If set B is a subset of set A, N (A U B) = N (A)

(Venn Diagram showing set B as a subset of set A, no numerical example)

To count whole objects or elements, the counting theorem generally uses the natural numbers, even if an element possesses the property of anti-existence and may be treated as a negative element.

In other words, the counting function is able to count negative elements as elements of the set since it enumerates a set as a collection of objects or elements. For example, the counting function is able to count the natural numbers and the negative integers as distinct elements of the set of integers.

In other words, since anti-existence may be a trait or characteristic of an element, set theory is able to enumerate or list an element with the property of anti-existence as well as elements that represent a state of existence. A set is not an operation that combines two elements into another element like addition.

In addition to listing elements with the property of anti-existence, a set may list or enumerate an element with the property of non-existence, either using zero to represent the empty set, or a pair of empty brackets or { }, which represents the enclosure for the empty set as a set that does not contain any elements.

The inclusion of zero or the empty set as an element of a set is specified by how a set is defined, such as a number line that include zero as a point of origin. Its inclusion is not necessarily left unspecified since a set is defined by a common trait or characteristic.

In particular, some types of sets such as the set of natural numbers are designed to include only elements that represent a state of existence, and exclude zero as the empty set or an element that represents the state of non-existence.

The idea of a set being able to list elements with the properties of existence, anti-existence, and non-existence is illustrated by the set of integers, which includes the set of natural numbers, their mirror image of the set of negative integers, and zero, which represents the empty set.

The mirror image symmetry between the natural numbers and negative integers has its root in how each set may each be constructed by using a single element, one and negative one, and the operation of addition.

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In other words, just as one and negative one are symmetrical to each other since they lie at an equal distance on opposite sides of zero as the point of origin of a number line, their resulting sums, of one plus one or two, and negative one plus negative one or negative two, and so forth, are symmetrical with each other.

Or in other words, the geometrical interpretation of one and negative one as discrete elements that lie an equal distance from each other on a number line means they have the same elemental composition, and the difference between them is defined by the point of origin used to order them on a number line.

While one and negative one have the same displacement, as measured from their point of origin of zero, making them highly symmetrical, they lie in opposite directions, making them opposite in nature.

Addition

Since set theory generally does not double count an intersection between two sets, addition may be explained as the application of the counting function to the union of two sets. The sum from the union of two sets equals the count of elements in the two sets, less any double counting from their intersection.

While addition may also be explained as the application of the counting function to the union of two sets that are disjoint, the net result that applies the counting function within the enclosure or boundary of a single set remains the same.

If the elements in the union of two sets are the same type of element, the boundary of their union does not need an explanation of the change in boundary. But if the elements in the union encompass different traits or characteristics, the change in boundary needs some type of explanation, according to the different traits or characteristics that their union combines or encompasses.

In other words, while Venn Diagrams are useful in depicting the operations of union and intersection, the change in boundary involved with the operations may need some type of explanation, depending on whether the elements involved are the same type of element, or if there was a change in their classification.

An explanation of the change in boundary would be similar to the explanation for the partition of a set into subsets, which refines or divides a set according to the different types of elements encompassed by their general trait or characteristic, or a common numeric factor.

Regarding Venn Diagrams, set theory generally assumes that the elements of a set are grouped together in one location, like the books in a library, rather than being scattered over a broad area, or intermingled with the elements of other sets.

While a set may contain elements that are widely scattered, just as library books on loan may be found all over a city, the elements usually possess some indicator of belonging to the set, just as a library book on loan usually contains a pocket identifier with a return date marked on it.

Grouping the elements of set together makes them easier to count, and construct a boundary around, whether in a physical or abstract sense, so that they may be quickly and easily

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distinguished from the elements of other sets. However, some sets are designed to include elements that are widely scattered, whether in source or location.

For example, financial statements that organize financial data into a cash flow statement and balance sheet often bring together data that may come from widely scattered sources or locations into the same set.

In other words, sets are often used to bring together similar information from widely scattered sources. But while this information may be closely related, at least by subject, and organized by time and order of occurrence, work is usually needed to manage the information or elements of the set over long distances.

Much like the grouping of elements into a set, which share a common trait or characteristic, addition is performed only when the elements involved lie close together, and within the same set or boundary so that their numeric data or information may be aligned in a specific pattern.

Specifically, the elements involved in addition are usually placed directly under each other to align their base ten digits, starting from the lowest place. Then, starting with the lowest place, the digits from the same place are added together, with any carryovers used in performing the addition for the next place.

Alternatively, if the elements in an addition are placed next to or adjacent each other, their sum is computed by adding the digits from the same place, starting with the lowest place.

This requirement for addition to be performed within the same set and for the elements involved to be aligned in a specific pattern is similar to how the annihilation of matter with anti-matter, and many other atomic reactions, require the close proximity of the elements or particles involved.

Subtraction

Where addition may be viewed as the application of the counting function to the union of two sets, subtraction may be viewed as a type of reverse union that transfers elements out of a set and into its complement or another set, and applies the counting function to the remaining elements in the set.

Subtraction may be illustrated by the activity of shopping, which transfers money out of a purse or wallet. The purse or wallet surrounds the elements of the set, which consists of a fixed amount of money and perhaps some debit or credit cards. Elements are transferred out as cash is taken out, or debits are made to a bank account or credit card in exchange for goods or services.

As subtraction takes elements out of a set, its numeric effect may be depicted by the addition of a negative integer to a positive integer. Subtraction illustrates the addition of an element that possesses the property of anti-existence, which reduces the number of elements in the set, or size or quality of an element.

Coordinate Systems and Systems

In contrast to sets, coordinate systems use positive and negative numbers to count or measure length or displacement with respect to a point of origin. Coordinate systems are usually one,

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two, or three dimensional, depending on whether they operate along a line or curve, a plane or surface, or in space.

While coordinate systems use positive or negative numbers to describe the location of a point or object using coordinates, the numbers or values in their coordinates may change, depending on a shift in their point of origin. In other words, the use of numbers in a coordinate system is relative, based on its point of origin.

However, the point of origin used in a coordinate system sometimes appears naturally, giving it the flavor of being an invariant. For example, number lines typically use zero as a point of origin, just as rulers and yardsticks use one end as zero to count length. Other natural points of origin appear in the cornerstone of a building used in architectural drawings, or a prominent landmark used in a survey.

In addition to serving as a point of origin for a number line or coordinate system, zero often serves as a point of balance or equilibrium for many physical systems. The use of zero as a point of balance or equilibrium may be illustrated by a scale of weights.

On one side of the scale, a pan holds an object being weighed. The other side holds a pan to which measured weights are added as the system is brought to balance, and the weight of the object is determined, based on the weights that are added.

In other words, in a scale of weights there is a dynamic where the system seeks to reach a point of equilibrium or balance as weights are added or subtracted to match the unknown object, and zero appears as a point of balance.

Many other physical systems also use zero as a point of balance or equilibrium, including finance and economics. In these cases, zero typically represents a point of balance in the activity of such systems, rather than a fixed point of reference used to determine a value or location.

Points of balance or equilibrium often appear in both closed and open systems. Closed systems are usually found in biology or physics. Open systems are often found in finance and economics, although constraints may appear as the size of a potential market based on a given population.

Systems may also grow over time, just as the balance sheet for a growing company may grow with the accumulation of assets and liabilities. As growth in income translates into growth in assets, this growth is matched with increased liabilities, at least in the sense that the growth is owned by the stockholders.

In other words, many systems operate where opposing elements flow, and do not obliterate each other, just as income and expenses flow in a business, or electrons swirl around the nucleus of an atom.

Moreover, a point of balance or equilibrium may change over time, depending on changes in its underlying system, just as the physical universe seems to be expanding at some rate, which seems to change, or for which measurements are refined.

In summary, systems often use elements with the property of anti-existence to portray their activity. Since this activity does not require the immediate annihilation of opposing elements,

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zero has at least two distinct meanings, one as the numeric value of an empty set, the other as a point of balance or equilibrium.

Coordinate Systems, continued

Where in set theory the natural numbers are almost always used to count the number of objects or elements in a set and the use of negative integers may be inferred to depict an element with the property of anti-existence, in a coordinate system, the use of negative lengths, areas, and volumes is practically prohibited.

In other words, in a coordinate system, lengths, areas, and volumes are always positive, just as a count of the number of elements in a set is always positive. Lengths, areas, and volumes have positive values since they represent elements within a set that possess a displacement, which a coordinate system seeks to measure.

Lengths, areas, and volumes are also positive since a length or displacement is computed by subtracting a lesser value or amount from a greater value or amount, as determined by their relative position with respect to a point of origin. Since distances are computed to be positive, their products of areas and volumes are also positive.

From another point of view, the length or displacement of a line or curve is always calculated to be positive like the absolute magnitude of a vector. In other words, a line or curve has a length or displacement, which is intrinsically positive in value or amount, to which a vector assigns a direction.

There are four quadrants to a Cartesian coordinate system for a plane. In the first quadrant, the x and y coordinates are positive. In the second quadrant, the x coordinate is negative, but the y coordinate is positive. In the third quadrant, the x and y coordinates are negative. In the fourth quadrant, the x coordinate is positive and y is negative.

But fundamental to the Cartesian coordinate system is how the calculation of length, area, or volume is independent of the quadrant or quadrants that it is located in. In other words, in a coordinate system, the location of an element or object has no effect upon its basic properties of length, area, or volume.

In other words, lengths, areas, and volumes are always positive since their geometrical interpretation is type of invariant, independent of their location or the point of origin of a coordinate system.

However, when a point with the property of anti-existence or negative value, is added or combined to a point in the coordinate system, the result is the removal of that point from the system since it becomes a point with no existence, and may be viewed as being transferred to the null or empty set.

Technically speaking, while a point of origin uses zero for its coordinates, the addition of a point with a negative point that possesses the property of anti-existence may be taken to result in a point that does not have any existence, although it may algebraically be represented by the coordinates of zero, like a point of origin.

So, while a point without existence may use the coordinates of zero to represent the empty set, there is still a difference between a point of origin and point with no existence. In other words,

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in this instance, rather than a point of origin, a zero point may also represent a point with no existence.

In other words, a point that has the property of anti-existence is a slightly different concept than a point with negative coordinates. While it may distribute the negative sign to its coordinates, so it can destroy or annihilate another point, and so remove it from the coordinate system, the net result becomes a zero point or a point with no existence that lies outside the system.

In other words, a coordinate system can lose a point if the point is combined with a negative point that possesses the property of anti-existence. Likewise, a line, which can be described by two points, may be removed from a coordinate system if it is combined with a mirror image line that possesses the property of anti-existence.

Following this line of argument, a tunnel or hole, which may be described by a line and a two dimensional construct such as a circle, may be removed from a coordinate system if it is combined or added to a mirror image tunnel or hole that possesses the property of anti-existence.

In other words, just as a set can have elements transferred out of it, so can a coordinate system have elements transferred out of it, whether points, lines, or a three dimensional tunnel. But this loss of elements is only fleeting since a coordinate system is able to repair itself quickly.

A coordinate system is able to quickly repair itself since it is a reference system, defined by a point of origin and its axis lines, which impart its dimensions, letting it replace any information about missing points or elements since this loss is local, or limited in its extent.

A loss of points or elements, or information is local if it involves a closed geometric figure or construction over a temporary period of time, so the loss is not permanent and the coordinate system is able to replace the missing information.

In other words, a coordinate system is able to quickly repair itself since the identity of the missing elements is available to it, using its point of origin and axis lines. Moreover, the system is able to act promptly to restore itself to equilibrium as it has no employees that are taking time off, on vacation, sick leave, maternity leave, paternity leave, or Super Bowl party leave.

In other words, just as a line is smooth and continuous, a coordinate system that uses axis lines seeks to maintain the character of being smooth and continuous. The system seeks a state of equilibrium that quickly replaces the identity of missing points or objects. As an information management system, it is able to quickly provide information about the location of any missing points or objects.

In other words, just as a line with an eraser mark between it may be redrawn, a line in space is able to restore any missing points or voids to maintain its continuity. As a result, a coordinate system is able to restore a missing point or void based on the formulation of a line as a minimum distance that connects two points.

As a practical matter, it may be thought that the amount of time a coordinate system needs to replace a missing point or object is similar to the amount of time that a powerful computer uses to process a tiny amount of information, or for a quantum jump to occur within an electron shell.

These ideas about the annihilation and restoration of a point or element in a coordinate system are similar to the tracking and neutralization of cyber attacks and viruses, as cyber security

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systems routinely track and annihilate elements of intrusion in order to maintain their state of security or equilibrium.

Since anti-existence allows for the annihilation of a point or line within a coordinate system, it allows a negative area or volume, or the construction of a tunnel that can "fold" space and time by the annihilation of its structure, since this structure is mainly informational in its nature.

The construction of a negative volume or tunnel through space may be reasoned to require relatively little force since space is a void that generally contains a low density of gas, dust, and particles. In other words, relatively little energy would be expected to do work upon a void that contains a low density of matter.

In other words, since space is mainly a coordinate system that defines a void, or distance between different points or objects such as stars or planets, it may be manipulated. As a result, using the anti-existence theorem, a negative volume or space, which possesses the property of anti-existence, may be applied to the temporary annihilation of its structure.

Once the force used to construct a negative volume is turned off, the negative volume will lose its existence. The coordinate system quickly repairs itself to return to a state of equilibrium, taking only a moment in time.

A negative volume may be constructed and controlled by varying the amount of force that is used to create it, based on its area, the direction the force is applied, and the length of time the force is applied, which, presumably, should affect its length. The length of negative volume may be, or is likely to be affected by the amount of mass within it.

While the folding of space may affect the transmission of different forces through space, by temporarily shortening distance in space, the transmission of force between two points does not seem to prohibit it. In other words, the transmission of force in space does not seem to prohibit the manipulation of space.

Similarly, the construction of anti-time would make time travel possible. While this seems technically impossible with current technology, the ability to create a negative volume in space could lead to the ability to create anti-time as a quantity that may be manipulated.

Moreover, the creation of anti-time would be likely lead to the creation of a bridge between two different points in time to let the space time continuum return to equilibrium, or its normal flow, as time seems to flow continuously, at a uniform or constant rate along a coordinate axis.

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