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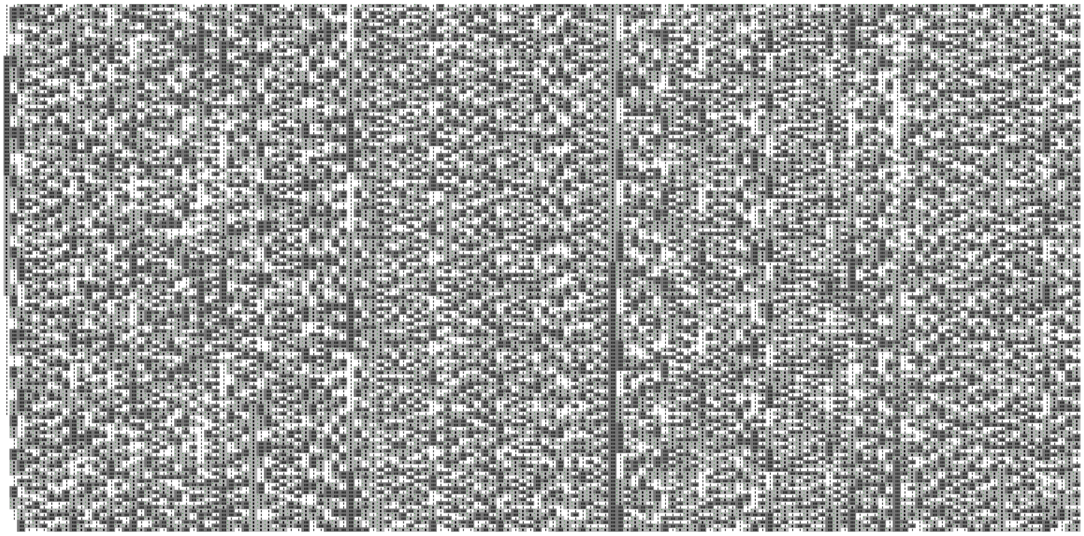
A Brief Introduction to Prime Mechanics

Version 1.1 – Mar. 19, 2021



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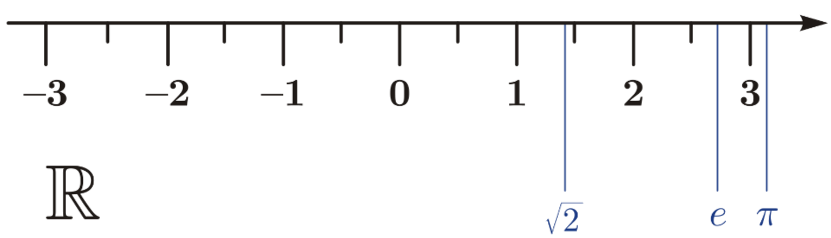
Introduction

One is a number that often goes unnoticed - it's simply there. The heart of the Natural numbers, one is a base unit for so much of the world that this fact may present itself as nothing more than an unconscious thought to most people – a foundation of logic laying the groundwork for a lifetime of conscious and subconscious number pattern recognition. One meter, one second, one person, one sun – a sea of labels.

Add a zero and you have enough data to visualize the binary code inherent to conventional computer systems. Traditionally recognized as a non-value, zero has as much use in applied mathematics as it does in more abstract areas of study such as philosophy, metaphysics and spirituality – alongside its counterpart one.

None of what has been stated should seem far from the ordinary because much of the world relies on the Real Number system, a system that has developed over generations of study and application.



(Source: https://en.wikipedia.org/wiki/Real_number)

Prime Mechanics does not rely on the Real Number system. In fact, it violates the very division of Rational and Irrational numbers within this system by relying on π as its base value, equating to 'one' in the language's notation. Zero is not a non-value in Prime Mechanics – it is always two Pi.

This short work is an effort to provide the reader with an introductory understanding of Prime Mechanics – its laws, notation, early mapping to Classical Mechanics and a brief outline of the vision behind its development. For a more in-depth look at the early scope of the Axiom project, the reader may visit the project site at www.prime-mechanics.com.

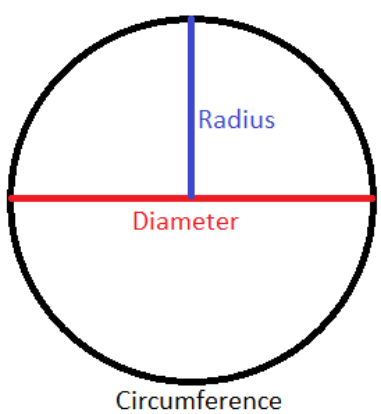
Classical Mechanics

Classical Mechanics (CM) is defined here as any discipline (field of study or application) that utilizes the Real Number system.

There is a fundamental division within this system – Rational and Irrational numbers. At the heart of the Rational numbers are Natural numbers including one (1), two (2), three (3), etc... Irrationals include values such as π, e and $\sqrt{2}$. CM also utilizes the imaginary number i, of the expression $i^2 = -1$. Zero(0) is used in CM through notation such as binary (Base-2) and decimal (Base-10). Base-60 provides much of the world with a perspective of Time relative to a 24-hour day/night cycle using hours, minutes and seconds. While not all Number Theory relies on these concepts, they are commonplace around most of the modern world (2021, Gregorian calendar).

What is important to note about the categorization of Real Number disciplines as collectively falling under the umbrella of CM is this division of Rational and Irrational. There's a story about Isaac Asimov getting into a debate with his teacher when the teacher breaks a piece of chalk into two, holds up a piece and states that it's half a piece of chalk. Asimov replies by stating that it is, in fact, still one whole piece of chalk. Regardless of which side one may take in this debate, both sides would be considered arguments of CM, which I will explain a bit further on. In essence, we find that conventional mathematics creates a natural division of infinite and finite expression. From Thermodynamics and Electromagnetism to Probability and Uncertainty, this division of 'definable' and 'undefinable' manifests within the logic of the Real Number system itself.

In the next chapter we'll see how Prime Mechanics relies on a fundamentally different logic base than CM, but first we need to look at how CM understands the value Pi. As I mentioned earlier, Pi(π) is considered an Irrational value in CM, whereas one (1) is regarded as the simplest Natural number (some number theorists dispute zero as a Natural number, but as we'll see moving forward the merit of this dispute is irrelevant to the logic base of PM).



$$\pi = \frac{C}{d}$$

$$\tau = \frac{C}{r}$$

In CM, Pi is the fixed ratio of Circumference to Diameter for a unit circle. Two Pi then refers to Tau (τ) the ratio of Circumference to Radius.

We may express the following:

π (Pi) radians = 180°
2π (Tau) radians = 360°

We may also express these values in decimal notation:

$\pi = 3.141\ldots$ etc.
$\tau = 6.283\ldots$ etc.

A seemingly trivial observation is that although Tau's ratio is dependent on a value half the size of that which Pi is dependent on (radius versus diameter), its value is twice that of Pi. In the case of rudimentary applications in geometry, Diameter = 2xRadius and Tau = 2xPi are also not mutually exclusive. It is important to note that Pi, when using Real Numbers, may always be given a starting value of 3.

Prime Mechanics

Prime Mechanics (PM) is a form of logic that relies on three laws. Two of these three laws violate Classical Mechanics, giving PM a logic foundation distinct from publicly taught and applied mathematics as of 2021.

The name *Prime Mechanics* is derived from the language's use of π as its prime value – the base unit and operator from which the language is structured. We assign π the value 1 in PM, going a step further in written expression by using the character 'I', similar to a capital 'i' or lower-case 'l'. When using PM, we may also refer to π as 'one'.

The Three Laws of PM may be expressed in a number of ways:

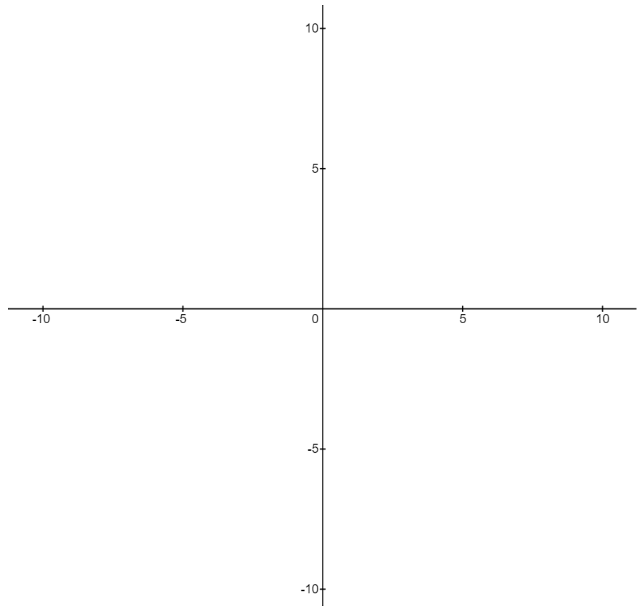
I == 00	Pi equals two Tau	[3Xx) == [12Xx)
II == 0	Two Pi equals Tau	[6Xx) == [6Xx)
III == 000	Three Pi equals three Tau	[9Xx) == [18Xx)

While only the second law, two Pi equals Tau, is validated by CM, it is critical to note that the values two and zero are not equivalent in CM – in CM, 0 = 0, 2 = 2, and 0 ≠ 2. Also recall that in CM, the Real Number system states that One and Pi exist as rational and irrational numbers, respectively. By assigning Pi to I and Tau to 0, PM uses logic that requires a different notation and operator in order to develop further.

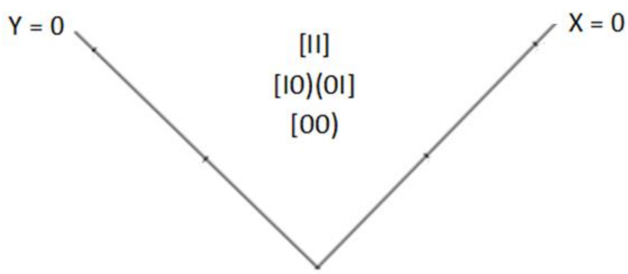
III
0
I

I, 0 and III are the simplest forms of Prime notation, which is infinitely expandable using the tally method. I is a more efficient expression of 00, just as 0 is a more efficient expression of II – in both cases, one character is used to represent two. The third value may be expressed in four ways – III, 000, I0 and 0I. This value is of special importance with regards to decimal (Base-10) systems because the number 10 in CM has two values in PM – I and III.

Before going further it's important to understand why the forward-diagonal expression of Prime notation is the most effective. CM relies heavily on the 4-quadrant system (below):



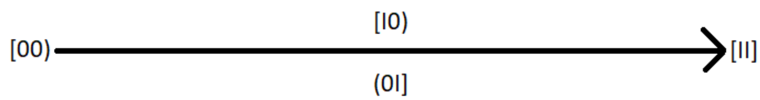
PM only utilizes the first (+,+) quadrant of this system:



While this may seem restrictive at first, using π as the sole operator allows us to navigate this field by providing us with a Primer: [00)[I0)(0I][II]. This Primer follows the III Laws:

II == 0
III == 000
I == 00

The significance of our third law is that it equates I0 and 0I. By arranging our Primer as it's shown above, we provide a visual aesthetic of the π operator. In earlier works and on the PM site, this operator has also been written as both [3Xx) and [00). [NXx) denotes the I-dimensional (linear) expansion of an initial value – in the case of [3Xx), N = 3. We may express Tau (2Pi) as [6Xx). Where I == 00 is the first law of PM, we may also express the operator π as [00). The bracket notations in both examples reference a ray form, the same form denoted by the Primer:



In the case of our I-dimensional (that is, *pi*-dimensional) line, we have a fixed III-body process correlating to the III laws of PM. In CM there is a different expression for expansion and reduction - in decimal notation for example, we may visualize this expansion and reduction by adding zeros to our base value of 1:

…1,000 , 100 , 10 , 1 , 0.1 , 0.01 , 0.001…

Keep in mind that 10 (ten) does not equal 3 (three) and 1 (one) in CM. It's also important to recognize that values beyond 1 are dependent on 0. While we may express 1 in decimal notation as 1.0, the root of the Natural numbers is not dependent on the non-value 0 in CM.

In Prime notation, these values are simply considered loops of π and τ, reducible to the source, I == 00:

…I000 , I00 , I0 , I , 0I , 00I , 000I…

By measuring quanta using orders of magnitude such as these, the point of reference may change, but zero remains at the baseline, exemplified in Thermodynamics by the term Absolute Zero (0K = -273.15°C). PM defines Absolute Zero in its first law, 00 == I, equivocating the thermodynamic state 0K = -273.15°C to π. By integrating all four of the Cartesian quadrants into a single, forward-diagonal plane, PM then establishes a channel for measuring Absolute Zero as a ray [00) rather than a limit, with the I-dimensional π as the channel's operator.

Using the III Laws across number groups, we may establish a conversion table for the Base-10 radix (numbers 0-9). This is necessary for understanding how to convert notation relying on Base-10. While CM may utilize a variety of base systems, Prime notation adheres to the III Laws of PM. Since I is <u>always</u> π and 0 is <u>always</u> τ in PM, these characters have enhanced application over the binary set 1 and 0 (Base-2) in CM.

Base-10
Radix

III	3	6	9
0	2	5	8
I	1	4	7
	I	II	III

Our First III Laws establish the Primer:
1: I == 00
2: II == 0
3: III == 000

All greater values are simply higher orders of the III Laws, with an increase in the number of folds (binary conversions) as we go higher:

4:   IIII == 00 == I
5:   IIIII == 0000 == II == 0
6:   IIIIII == 000 == III
7:   IIIIIII == 00000 == IIII == 00 == I
8:   IIIIIIII == 0000 == II == 0
9:   IIIIIIIII == 000000 == III == 000
10: IIIIIIIIII == 00000 == IIII == 00 == I
11: IIIIIIIIIII == 0000000 == IIIII == 0000 == II == 0
12: IIIIIIIIIIII == 000000 == III == 000
13: IIIIIIIIIIIII == 00000000 == IIII == 00 == I
14: IIIIIIIIIIIIII == 0000000 == IIIII == 0000 == II == 0
15: IIIIIIIIIIIIIII == 000000000 == IIIIII == 000 == III
16: IIIIIIIIIIIIIIII == 00000000 == IIII == 00 == I
17: IIIIIIIIIIIIIIIII == 0000000000 == IIIII == 0000 == II == 0
18: IIIIIIIIIIIIIIIIII == 000000000 == IIIIII == 000 == III
19: IIIIIIIIIIIIIIIIIII == 00000000000 == IIIIIII == 00000 == IIII == 00 == I
20: IIIIIIIIIIIIIIIIIIII == 0000000000 == IIIII == 0000 == II == 0
…

Converting from tallies to the operator notation [00) and writing from bottom-to-top in line with the Primer, our first twenty numbers look like this:

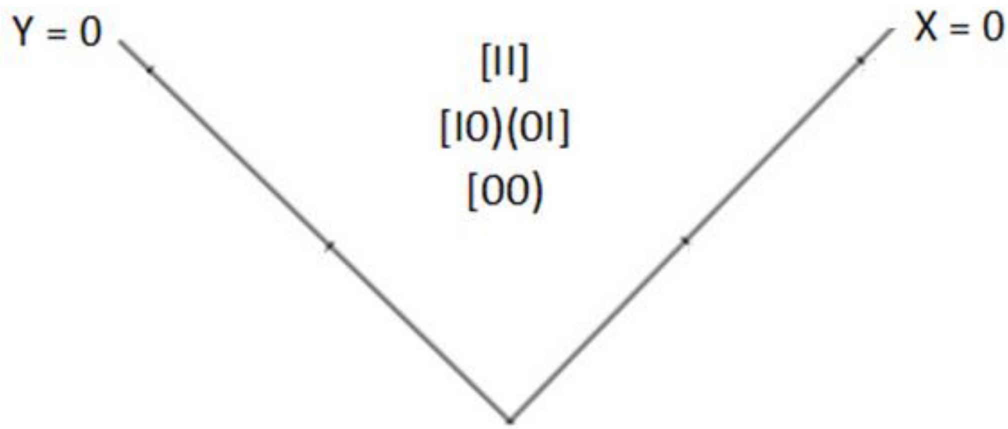
Primary

[20)[10)[5)[4)[2)(0]
[19)[11)[7)[5)[4)[0)(1]
[18)[9)[6)[3)(3]
[17)[10)[5)[4)[2)(0]
[16)[8)[4)[0)(1]
[15)[9)[6)[3)(3]
[14)[7)[5)[4)[2)(0]
[13)[8)[4)[0)(1]
[12)[6)[3)(3]
[11)[7)[5)[4)[2)(0]
[10)[5)[4)[0)(1]
[9)[6)[3)(3]
[8)[4)[2)(0]
[7)[5)[4)[0)(1]
[6)[3)(3]
[5)[4)[2)(0]
[4)[0)(1]
[1)(0]
[1)(1]
[0)(0]

Note that in this depiction, the third value is [I)(0] – this may also be expressed as [0)(I]

Iterations of 10 are a special case because under Base-10 we recognize that this is a grouping of ten individual units. Using our III Laws, however, we can choose to immediately convert 10 to III or 000, making 10 the first value in Base-10 to have alternate notation (I , III).

The reader may recall that the Primer is ordered I, III, 0 when expressed as a forward-diagonal:



[Xx) - Numbers (Full)	The III Laws		Natural Numbers to Prime notation								[Xx) - Numbers
[20)[10)[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**20**	10	5	4	2	0		**0**	[4)[2)(0]
[19)[11)[7)[5)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**19**	11	7	5	4	0	1	**I**	[4)[0)(1]
[18)[9)[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**18**	9	6	3	3			**III**	[6)[3)(3]
[17)[10)[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**17**	10	5	4	2	0		**0**	[4)[2)(0]
[16)[8)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**16**	8	4	0	1			**I**	[4)[0)(1]
[15)[9)[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**15**	9	6	3	3			**III**	[6)[3)(3]
[14)[7)[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**14**	7	5	4	2	0		**0**	[4)[2)(0]
[13)[8)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**13**	8	4	0	1			**I**	[4)[0)(1]
[12)[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**12**	6	3	3				**III**	[6)[3)(3]
[11)[7)[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**11**	7	5	4	2	0		**0**	[4)[2)(0]
[10)[5)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**10**	5	4	0	1			**I**	[4)[0)(1]
[9)[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**9**	6	3	3				**III**	[6)[3)(3]
[8)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**8**	4	2	0				**0**	[4)[2)(0]
[7)[5)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**7**	5	4	0	1			**I**	[4)[0)(1]
[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**6**	3	3					**III**	[6)[3)(3]
[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**5**	4	2	0				**0**	[4)[2)(0]
[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**4**	0	1					**I**	[4)[0)(1]
[0)(1]	III == 000	[9Xx) == [18Xx)	**3**	3						**III**	[0)(1]
[1)(1]	0 == II	[6Xx) == [6Xx)	**2**	0						**0**	[1)(1]
[0)(0]	I == 00	[3Xx) == [12Xx)	**1**							**I**	[0)(0]

I 0 I 0 I 0 I 0 I 0 I 0 I

Base-10
Radix

III	3	6	9
0	2	5	8
I	1	4	7
	I	II	III

[Xx):
Pi Operator [00)

Primer
[II]
[0)(0]
[00)

This ordering reveals the loop within Prime notation. To get a better visual of how number values fold within one another using the π operator [00), let's look at the first twenty Natural numbers (left).

Following the conversion provided by our III Laws, we get a defined pattern of I, 0, III. Alternate notation forms its own series of patterns, a fact which provides an alternate method to CM for understanding concepts such as manifolds, dimensions, matrices and other abstract constructs within Number Theory.

It's important to note that we are assigning all starting values the form N = πN. In other words, any Natural number N is simply a grouping of iterations of π where π equals one.

By using the notation [Xx) to denote the π operator [00), we establish a method for folding (converting through binary tallying) any Natural number N into one of the Prime values. Our first three are expressed, from bottom to top:

[1)(0]
[1)(1]
[0)(0]

Correlating to the Prime notation:

III
0
I

From this point on, just as with our tally notation, values four (4) and beyond will revert to Prime notation. All values beyond 3 adhere to the following loop:

[6)[3)(3]
[4)[2)(0]
[4)[0)(1]

Recall π as [3Xx) and τ as [6Xx) – in this case, D = 2r and Tau = 2Pi are not mutually exclusive, with [6)[3)(3] expressing both of these statements. 3 = 2(6) is valid because [12Xx) reverts to [3Xx), returning a value of III in Prime notation.

We may then express Pi and Tau in the following terms:

Tau: 2r = 6
Pi: 1D = 3

Twelve as defined by using the π operator [00) gives us:

[12)[6)[3)(3]

Using the value 3 for D (where Pi is [3Xx)) gives us 3, keeping in mind that π as I is equivalent to [00):

[3)(3] == [0)(1] == [1)(0]

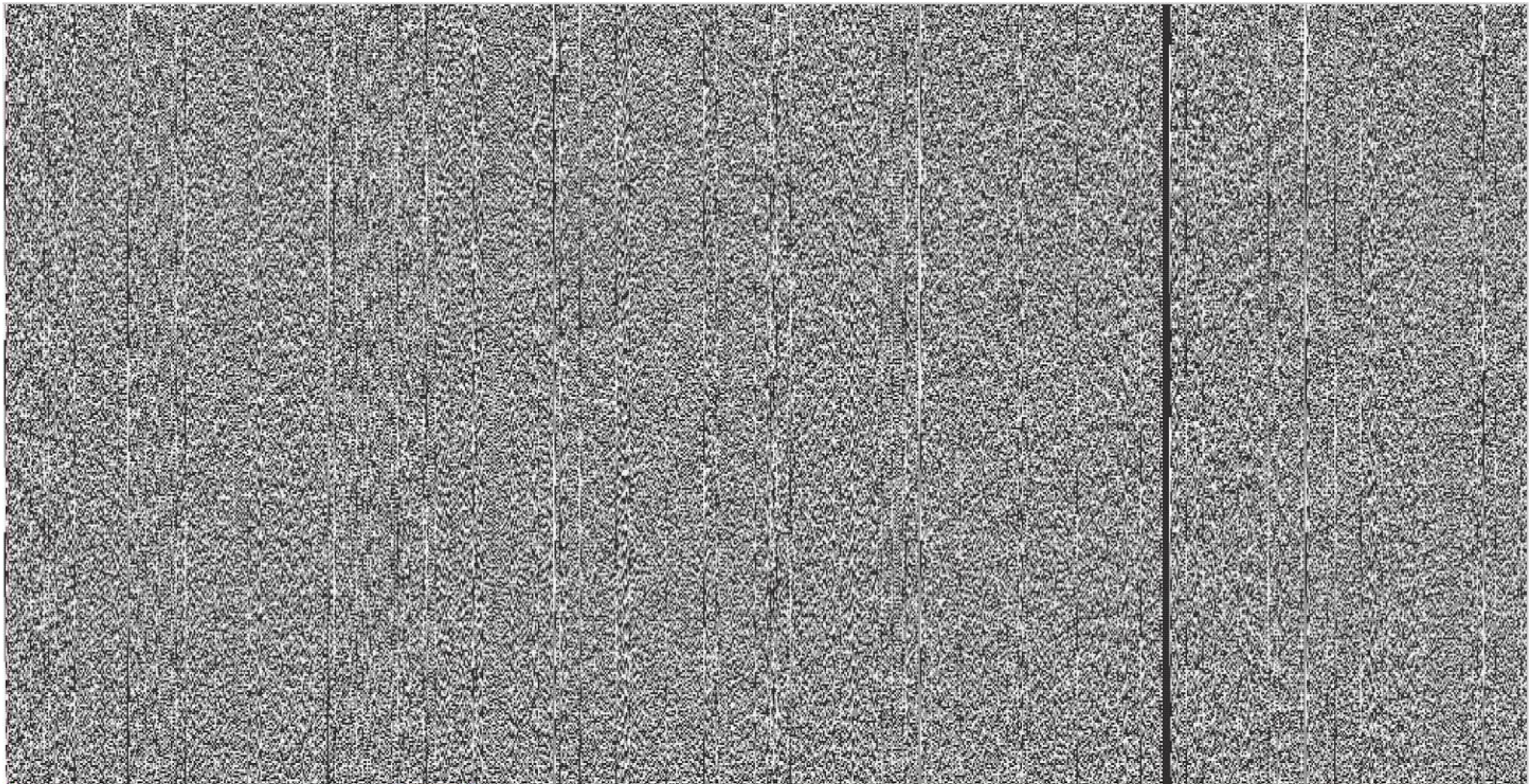
This equivocation is a result of the non-directional nature of PM where 0 is *not* a non-value, but τ. Since we may also denote [0)(1] as [1)(0], we have four ways of expressing three values (I0 == 0I == III == 000).

In order to understand how this applies to constructs such as Base-10, let's look at the conversion chart below (recommended zoom at 170% or above):

Iteration	[Xx) - Iteration	The III Laws		Decimal Notation to Prime Notation														[Xx) - Decimal
9	[9)[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**10000**	5000	2500	1250	625	314	157	80	40	20	10	5	4	I	[4)[0)(1]
7	[7)[5)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**1000**	500	250	125	64	32	16	8	4	0	1			I	[4)[0)(1]
5	[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**100**	50	25	14	7	5	4	0	1					I	[4)[0)(1]
3	[0)(1]	III == 000	[9Xx) == [18Xx)	**10**	5	4	0	1									I	[4)[0)(1]
1	[0)(0]	I == 00	[3Xx) == [12Xx)	**1**													I	[4)[0)(1]
3	[0)(1]	III == 000	[9Xx) == [18Xx)	**0.1**	5	4	0	1									I	[4)[0)(1]
5	[5)[4)[2)(0]	0 == II	[6Xx) == [6Xx)	**0.01**	50	25	14	7	5	4	0	1					I	[4)[0)(1]
7	[7)[5)[4)[0)(1]	I == 00	[3Xx) == [12Xx)	**0.001**	500	250	125	64	32	16	8	4	0	1			I	[4)[0)(1]
9	[9)[6)[3)(3]	III == 000	[9Xx) == [18Xx)	**0.0001**	5000	2500	1250	625	314	157	80	40	20	10	5	4	I	[4)[0)(1]

By understanding that each decimal expansion or reduction of 10 in PM equates to I and III in Prime notation, and that we may assign number values in Base-10 to precise values in Prime notation, we may convert decimal expressions to Prime notation. A much larger sample of the above set is available via the free workbook available on the project site.

The first image below shows a zoomed-out screenshot of π in decimal notation. The second image converts each Base-10 value to its corresponding value in Prime notation, shaded from white to dark grey. Doing so provides a direct method for visualizing number sequences within π by adding a conversion 'filter' to the viewer's perspective.

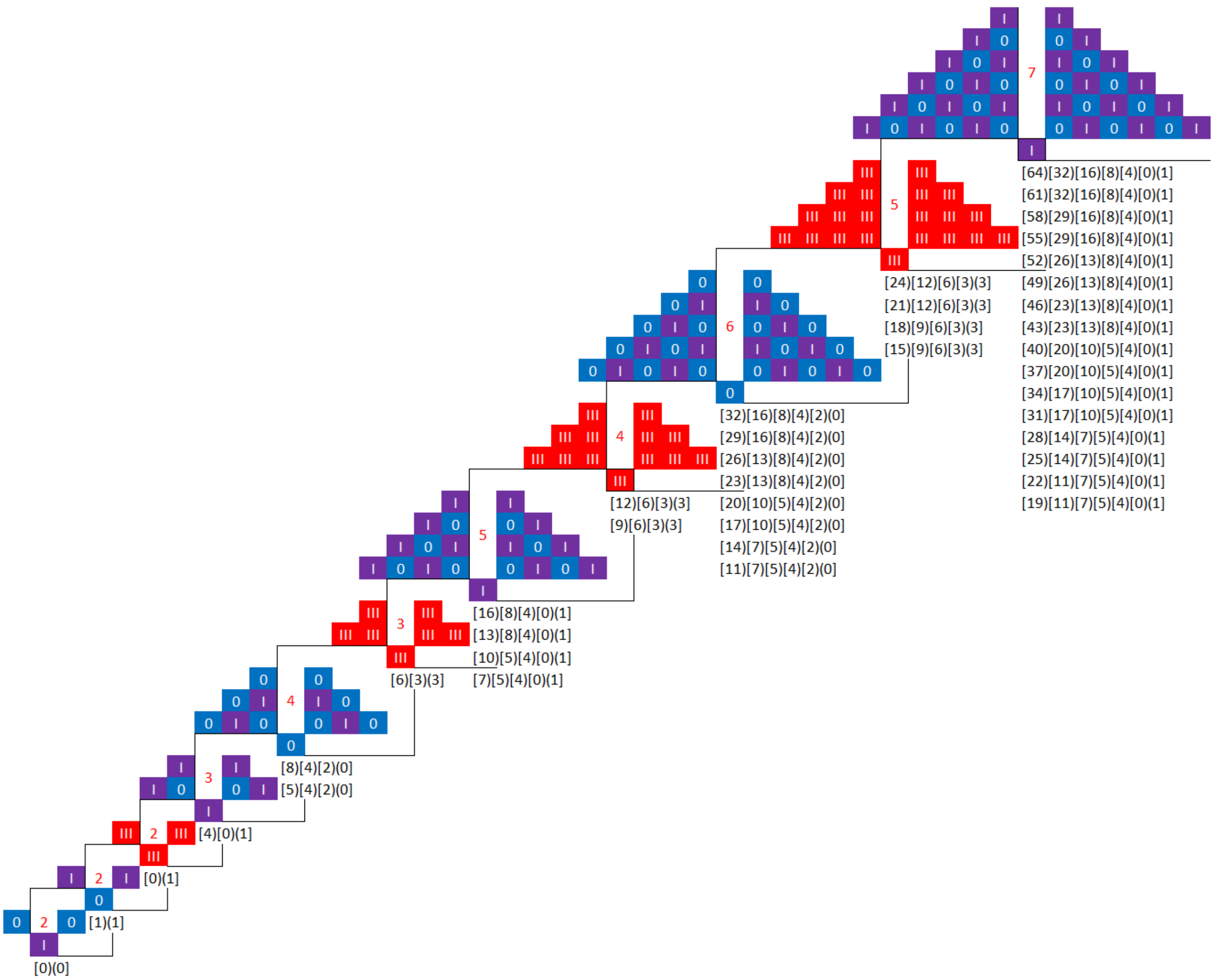


III.IIIOIIIOIIIOIIIOOIIIIIII…

III	3	6	9
0	2	5	8
I	1	4	7
0	'	"	'''

PI IN PRIME MECHANICS - 1001 DIGITS

By understanding iterations of I0 as iterations of π, Prime notation provides a visual framework for mapping and predicting complex sequences. When using the Base-10 radix conversion, it also allows us to understand number sequences of CM through a different visual and operative aesthetic.



Number values in the above diagram are converted to Prime notation and then color-coded. Let's see how a few well-known number sequences look when converted to this notation.

10τ	20π	3600	1800	900	450	225	114	57	30	15	9	6	3	3
		3420	1710	855	429	216	108	54	27	15	9	6	3	3
9τ	18π	3240	1620	810	405	204	102	51	27	15	9	6	3	3
		3060	1530	765	384	192	96	48	24	12	6	3	3	
8τ	16π	2880	1440	720	360	180	90	45	24	12	6	3	3	
		2700	1350	675	339	171	87	45	24	12	6	3	3	
7τ	14π	2520	1260	630	315	159	81	42	21	12	6	3	3	
		2340	1170	585	294	147	75	39	21	12	6	3	3	
6τ	12π	2160	1080	540	270	135	69	36	18	9	6	3	3	
		1980	990	495	249	126	63	33	18	9	6	3	3	
5τ	10π	1800	900	450	225	114	57	30	15	9	6	3	3	
		1620	810	405	204	102	51	27	15	9	6	3	3	
4τ	8π	1440	720	360	180	90	45	24	12	6	3	3		
		1260	630	315	159	81	42	21	12	6	3	3		
3τ	6π	1080	540	270	135	69	36	18	9	6	3	3		
		900	450	225	114	57	30	15	9	6	3	3		
2τ	4π	720	360	180	90	45	24	12	6	3	3			
		540	270	135	69	36	18	9	6	3	3			
τ	2π	360	180	90	45	24	12	6	3	3				
		180	90	45	24	12	6	3	3					
		1	0	1	0					1	0	1	0	1

Radians and Degrees to Prime notation. Each iteration of Pi provides us with [6)[3)(3].

Base-10 Radix

	'	''	'''
III	3	6	9
0	2	5	8
I	1	4	7

I == 00
II == 0
III == 000

Radians		Radians to Degrees	Degrees II to Prime notation										[Xx) - Degrees
	2π	2π = 360	**360**	180	90	45	24	12	6	3	3	III	[6)[3)(3]
	11π/6	11π = 1980	**330**	165	84	42	21	12	6	3	3	III	[6)[3)(3]
	7π/4	7π = 1260	**315**	159	81	42	21	12	6	3	3	III	[6)[3)(3]
	5π/3	5π = 900	**300**	150	75	39	21	12	6	3	3	III	[6)[3)(3]
	3π/2	3π = 540	**270**	135	69	36	18	9	6	3	3	III	[6)[3)(3]
	4π/3	4π = 720	**240**	120	60	30	15	9	6	3	3	III	[6)[3)(3]
	5π/4	5π = 900	**225**	114	57	30	15	9	6	3	3	III	[6)[3)(3]
τ	7π/6	7π = 1260	**210**	105	54	27	15	9	6	3	3	III	[6)[3)(3]
	π	π = 180	**180**	90	45	24	12	6	3	3		III	[6)[3)(3]
	5π/6	5π = 900	**150**	75	39	21	12	6	3	3		III	[6)[3)(3]
	3π/4	3π = 540	**135**	69	36	18	9	6	3	3		III	[6)[3)(3]
	2π/3	2π = 360	**120**	60	30	15	9	6	3	3		III	[6)[3)(3]
	π/2	π = 180 (2*90)	**90**	45	24	12	6	3	3			III	[6)[3)(3]
	π/3	π = 180 (3*60)	**60**	30	15	9	6	3	3			III	[6)[3)(3]
	π/4	π = 180 (4*45)	**45**	24	12	6	3	3				III	[6)[3)(3]
	π/6	π = 180 (6*30)	**30**	15	9	6	3	3				III	[6)[3)(3]

Base-10 Radix

III	3	6	9
0	2	5	8
I	1	4	7
	'	''	'''

I == 00
II == 0
III == 000

Alternate Radians and Degrees to Prime notation. Iterations of Pi less than 180 degrees still provide [6)[3)(3].

Prime Notation	Classical Mechanics		Prime Mechanics																
	Iteration	Prime Number	Operator [00], ordered as Binary from left to right													Prime Loop			
		1	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**				
I	37	**157**	80	40	20	10	5	4	0	1						4	0	1	I
III	36	**151**	77	40	20	10	5	4	0	1						4	0	1	I
0	35	**149**	76	38	19	11	7	5	4	2	0					4	2	0	0
I	34	**139**	71	37	20	10	5	4	0	1						4	2	1	I
III	33	**137**	70	35	19	11	7	5	4	2	0					4	2	0	0
0	32	**131**	67	35	19	11	7	5	4	2	0					4	2	0	0
I	31	**127**	65	34	17	10	5	4	0	1						4	0	1	I
III	30	**113**	58	29	16	8	4	2	0							4	2	0	0
0	29	**109**	56	28	14	7	5	4	0	1						4	0	1	I
I	28	**107**	55	29	16	8	4	2	0							4	2	0	0
III	27	**103**	53	28	14	7	5	4	0	1						4	0	1	I
0	26	**101**	52	26	13	8	4	2	0							4	2	0	0
I	25	**97**	50	25	14	7	5	4	0	1						4	0	1	I
III	24	**89**	46	23	13	8	4	2	0							4	2	0	0
0	23	**83**	43	23	13	8	4	2	0							4	2	0	0
I	22	**79**	41	22	11	7	5	4	0	1						4	0	1	I
III	21	**73**	38	19	11	7	5	4	0	1						4	0	1	I
0	20	**71**	37	20	10	5	4	2	0							4	2	0	0
I	19	**67**	35	19	11	7	5	4	0	1						4	0	1	I
III	18	**61**	32	16	8	4	0	1								4	0	1	I
0	17	**59**	31	17	10	5	4	2	0							4	2	0	0
I	16	**53**	28	14	7	5	4	2	0							4	2	0	0
III	15	**47**	25	14	7	5	4	2	0							4	2	0	0
0	14	**43**	23	13	8	4	0	1								4	0	1	I
I	13	**41**	22	11	7	5	4	2	0							4	2	0	0
III	12	**37**	20	10	5	4	0	1								4	0	1	I
0	11	**31**	17	10	5	4	0	1								4	0	1	I
I	10	**29**	16	8	4	2	0									4	2	0	0
III	9	**23**	13	8	4	2	0									4	2	0	0
0	8	**19**	11	7	5	4	0	1								4	0	1	I
I	7	**17**	10	5	4	2	0									4	2	0	0
III	6	**13**	8	4	0	1										4	0	1	I
0	5	**11**	7	5	4	2	0									4	2	0	0
I	4	**7**	5	4	0	1										4	0	1	I
III	3	**5**	4	2	0											4	2	0	0
0	2	**3**	0	1												0	1		I
I	1	**2**	0													1	1		0
		1	1													0	0		I
		1	0	1	0	1	0	1	0	1	0	1	0	1	0				

III == 000
II == 0
I == 00

Base-10 Radix

III	3	6	9
0	2	5	8
I	1	4	7
	'	''	'''

I == 00
II == 0
III == 000

Prime numbers to Prime notation. So far, no Primes have been found to result in [6)[3)(3].

The Fibonacci sequence to Prime notation. Each four iterations of Pi eventually reveal an 8-figure loop, bottom-to-top:

III

I

0

0

III

0

I

I

Base-10 Radix

III	3	6	9
0	2	5	8
I	1	4	7
	I	II	III

I == 00

II == 0

III == 000

In each of the above sequences we are taking a starting value and applying the III Laws through tally notation to reduce that value to Prime notation. Keep in mind that in PM, N = πN, or IN, where N is any Natural number and one equals π. Expressing the operator as [00) provides us with a method for reconverting Prime notation into Natural numbers using the radix converter.

Returning to the story from the previous chapter about Asimov and the chalk, whether we consider the chalk to be one-half of a whole or a whole piece on its own, we are still defining each quantity relative to a base unit of one, the root of the Natural numbers. Standard units allow us to quantify in terms such as 1 meter, 1 second, 1 rotation, 1 sun, 1 table, 1 tree, 1 atom, 1 quark, 1 galaxy – the list is endless, but the governing logic dictates that 1 is not equivalent to π. When we divide three by two in CM, we get one point five (3/2 = 1.5). When we subtract five from two, we get negative three (2-5 = -3). PM doesn't require partial or negative values because of its equivalence of I to π.

The reason both Asimov and his teacher would have been incorrect within the lens of PM is that in *both* cases, the answer would be π (I) piece of chalk.

$\sqrt{7}$	e	Feigenbaum Constant II (α)	Feigenbaum Constant I (δ)
26.45751311064590590501615753639	27.18281828459045235360287471352	25.02907875095892822283902873218	46.69201609102990671853203820466
23.81176179958131531451454178275	24.46453645613140711824258724217	22.52617087586303540055512585896	42.02281448192691604667883438419
21.16601048851672472401292602911	21.74625462767236188288229977082	20.02326300076714257827122298574	37.35361287282392537482563056372
18.52025917745213413351131027547	19.02797279921331664752201229946	17.52035512567124975598732011252	32.68441126372093470297242674326
15.87450786638754354300969452183	16.30969097075427141216172482811	15.01744725057535693370341723930	28.01520965461794403111922292279
13.22875655532295295250807876819	13.59140914229522617680143735676	12.51453937547946411141951436609	23.34600804551495335926601910233
10.58300524425836236200646301455	10.87312731383618094144114988541	10.01163150038357128913561149287	18.67680643641196268741281528186
7.93725393319377177150484726091	8.15484548537713570608086241405	7.50872362528767846685170861965	14.00760482730897201555961146139
5.29150262212918118100323150727	5.43656365691809047072057494270	5.00581575019178564456780574643	9.33840321820598134370640764093
2.64575131106459059050161575363	2.71828182845904523536028747135	2.50290787509589282228390287321	4.66920160910299067185320382046
$\sqrt{8}$	**ϕ (Phi)**	**$\sqrt{10}$**	**$\sqrt{6}$**
28.28427124746190097603377448419	16.18033988749894848204586834365	31.62277660168379331998893544432	24.49489742783178098197284074705
25.45584412271571087843039703577	14.56230589874905363384128150929	28.46049894151541398799004189989	22.04540768504860288377555667235
22.62741699796952078082701958735	12.94427190999915878563669467492	25.29822128134703465599114835546	19.59591794226542478557827259764
19.79898987322333068322364213893	11.32623792124926393743210784055	22.13594362117865532399225481102	17.14642819948224668738098852294
16.97056274847714058562026469051	9.70820393249936908922752100619	18.97366596101027599199336126659	14.69693845669906858918370444823
14.14213562373095048801688724209	8.09016994374947424102293417182	15.81138830084189665999446772216	12.24744871391589049098642037352
11.31370849898476039041350979367	6.47213595499957939281834733746	12.64911064067351732799557417773	9.79795897113271239278913629882
8.48528137423857029281013234525	4.85410196624968454461376050309	9.48683298050513799599668063329	7.34846922834953429459185222411
5.65685424949238019520675489683	3.23606797749978969640917366873	6.32455532033675866399778708886	4.89897948556635619639456814941
2.82842712474619009760337744841	1.61803398874989484820458683436	3.16227766016837933199889354443	2.44948974278317809819728407470
Glaisher-Kinkelin Constant	**$\sqrt{2}$**	**π (Pi)**	**$\sqrt{5}$**
12.82427129100622636875342568869	14.14213562373095048801688724209	31.41592653589793238462643383279	22.36067977499789696409173668731
11.54184416190560373187808311982	12.72792206135785543921519851788	28.27433388230813914616379044951	20.12461179749810726768256301858
10.25941703280498109500274055095	11.31370849898476039041350979367	25.13274122871834590770114706623	17.88854381999831757127338934985
8.97698990370435845812739798208	9.89949493661166534161182106946	21.99114857512855266923850368295	15.65247584249852787486421568111
7.69456277460373582125205541321	8.48528137423857029281013234525	18.84955592153875943077586029967	13.41640786499873817845504201238
6.41213564550311318437671284434	7.07106781186547524400844362104	15.70796326794896619231321691639	11.18033988749894848204586834365
5.12970851640249054750137027547	5.65685424949238019520675489683	12.56637061435917295385057353311	8.94427190999915878563669467492
3.84728138730186791062602770660	4.24264068711928514640506617262	9.42477796076937971538793014983	6.70820393249936908922752100619
2.56485425820124527375068513773	2.82842712474619009760337744841	6.28318530717958647692528676655	4.47213595499957939281834733746
1.28242712910062263687534256886	1.41421356237309504880168872420	3.14159265358979323846264338327	2.23606797749978969640917366873
ζ(3)	**Conway's Constant**	**γ**	**$\sqrt{3}$**
12.02056903159594285399738161511	13.03577269034296391257099112152	5.77215664901532860606512090082	17.32050807568877293527446341505
10.81851212843634856859764345360	11.73219542130866752131389200937	5.19494098411379574545860881074	15.58845726811989564174701707355
9.61645522527675428319790529209	10.42861815227437113005679289722	4.61772531921226288485209672065	13.85640646055101834821957073204
8.41439832211715999779816713058	9.12504088324007473879969378506	4.04050965431073002424558463057	12.12435565298214105469212439054
7.21234141895756571239842896906	7.82146361420577834754259467291	3.46329398940919716363907254049	10.39230484541326376116467804903
6.01028451579797142699869080755	6.51788634517148195628549556076	2.88607832450766430303256045041	8.66025403784438646763723170752
4.80822761263837714159895264604	5.21430907613718556502839644861	2.30886265960613144242604836032	6.92820323027550917410978536602
3.60617070947878285619921448453	3.91073180710288917377129733645	1.73164699470459858181953627024	5.19615242270663188058233902451
2.40411380631918857079947632302	2.60715453806859278251419822430	1.15443132980306572121302418016	3.46410161513775458705489268301
1.20205690315959428539973816151	1.30357726903429639125709911215	0.57721566490153286060651209008	1.73205080756887729352744634150

$\sqrt{9}$	$\sqrt{4}$	$\sqrt{1}$
30	20	10
27	18	9
24	16	8
21	14	7
18	12	6
15	10	5
12	8	4
9	6	3
6	4	2
3	2	1

Prime notation is being used to understand not only mathematical constants like those above, but physical constants as well. Physical constants such as the gravitational constant and the speed of light are based in Real Numbers, and as such operate within a separate set of logic from PM.

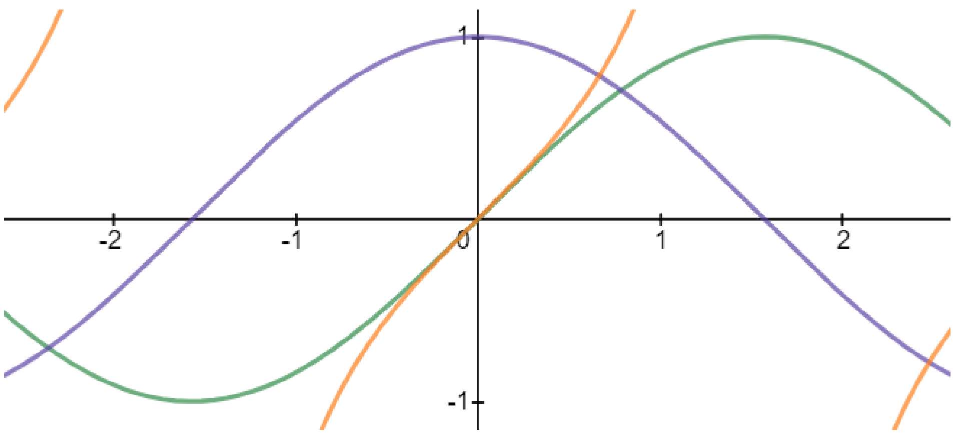
The following page provides an outdated but comprehensive list of physical constants:
https://www.nist.gov/system/files/documents/pml/div684/fcdc/wall2014.pdf

By relying on π as a standard unit, operator and primer, PM removes the need for unit conversions. This is why understanding how to map constants to Prime notation is a significant next step in the language's development.

Wave Functions

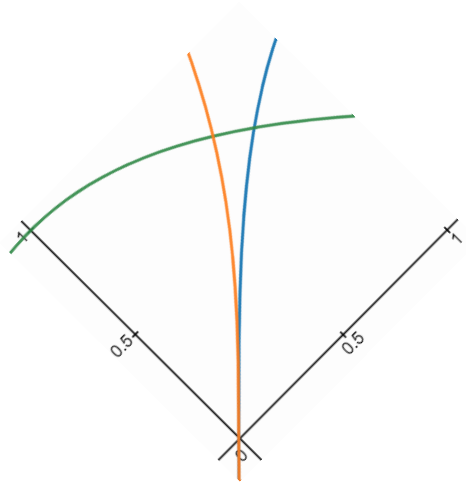
Knowing that PM redefines I and 0 as π and τ while integrating the four-quadrant (Cartesian) system into a single forward-diagonal field, let's take a more advanced approach and explore the conventional wave functions of CM.

Consider the cosine (purple), sine (green) and tangent (yellow) curves presented in the four-quadrant system below. In CM we learn that if we were to repeat our iterations of π, these wave functions would also repeat, up to an infinite amount, in opposing directions. That is to say, one may reiterate all three of these trigonometric functions (Sin, Cos, Tan) infinitely to the right or left in the image below.



Using the expression [3Xx) to define the π operator allows us to take concepts within CM and redefine them relative to Prime notation. In the case of Sin, Cos and Tan, these wave functions are conventionally mapped using the four-quadrant system.

To understand these functions in Prime notation, we rotate the quadrants 45 degrees counter-clockwise and reduce the range of the quadrant to I. Higher values are considered redundancies of greater complexity (Entropy), similar to fractal geometry – the Mandelbrot set is featured in many of the earlier works on PM.



PM is non-directional but most efficiently expressed as a forward-diagonal. By factoring in Csc, Sec and Cot, we can define these six functions within the forward-diagonal plane relative to [6Xx), or τ. While the above image depicts a limit of I for both the X and Y axis, the expressions of the Sin, Cos and Tan waves themselves is a current area of interest with respect to the operator [00). Here it becomes a matter of understanding how each curve is re-mapped relative to a single field where π is the sole operator [00), recalling the Primer [00)[I0)(0I][II].

						Trig Functions																					
Sin	Cos	Tan	Csc	Sec	Cot	Sin	Cos	Tan	Csc	Sec	Cot		Radians	[Xx) - π Radians	Sin/Cos (X,Y)	The III Laws	Degrees III to Prime notation										[Xx) - Degrees
0	I	0	∞	I	∞	0	I	0	∞	I	∞		2π	[1)(1]	(1,0)	0 == II [6Xx) == [6Xx)	**360**	180	90	45	24	12	6	3	3	**III**	[6][3](3]
	III==000/0		0	0/III==000		-1/2	$\sqrt{3}/2$	$-\sqrt{3}/3$	II	$2/\sqrt{3}$	$-\sqrt{3}$		$11\pi/6$		$(\sqrt{3}/2, -1/2)$		**330**	165	84	42	21	12	6	3	3	**III**	[6][3](3]
	II==0/0			II==0		$-\sqrt{2}/2$	$\sqrt{2}/2$	-I	$-\sqrt{2}$	$\sqrt{2}$	-I		$7\pi/4$		$(\sqrt{2}/2, -\sqrt{2}/2)$		**315**	159	81	42	21	12	6	3	3	**III**	[6][3](3]
	I/0					$-\sqrt{3}/2$	1/2	$-\sqrt{3}$	$-2/\sqrt{3}$	-II	$-\sqrt{3}/3$		$5\pi/3$		$(1/2, -\sqrt{3}/2)$		**300**	150	75	39	21	12	6	3	3	**III**	[6][3](3]
	0	∞		∞	0	-I	0	∞	-I	∞	0		$3\pi/2$		(0,-1)		**270**	135	69	36	18	9	6	3	3	**III**	[6][3](3]
		III==000			III==000/III	$-\sqrt{3}/2$	-1/2	$\sqrt{3}$	$-2/\sqrt{3}$	-II	$\sqrt{3}/3$		$4\pi/3$		$(-1/2, -\sqrt{3}/2)$		**240**	120	60	30	15	9	6	3	3	**III**	[6][3](3]
		I			I	$-\sqrt{2}/2$	$-\sqrt{2}/2$	I	$-\sqrt{2}$	$-\sqrt{2}$	I		$5\pi/4$		$(-\sqrt{2}/2, -\sqrt{2}/2)$		**225**	114	57	30	15	9	6	3	3	**III**	[6][3](3]
		III==000/III			III==000	-1/2	$-\sqrt{3}/2$	$\sqrt{3}/3$	-II	$-2/\sqrt{3}$	$\sqrt{3}$		$7\pi/6$		$(-\sqrt{3}/2, -1/2)$		**210**	105	54	27	15	9	6	3	3	**III**	[6][3](3]
0		0	∞		∞	0	-I	0	∞	-I	∞	τ	π	[0)(0]	(-1,0)	I == 00 [3Xx) == [12Xx)	**180**	90	45	24	12	6	3	3		**III**	[6][3](3]
I/0			0			1/2	$-\sqrt{3}/2$	$-\sqrt{3}/3$	II	$-2/\sqrt{3}$	$-\sqrt{3}$		$5\pi/6$		$(-\sqrt{3}/2, 1/2)$		**150**	75	39	21	12	6	3	3		**III**	[6][3](3]
II==0/0			II==0			$\sqrt{2}/2$	$-\sqrt{2}/2$	-I	$\sqrt{2}$	$-\sqrt{2}$	-I		$3\pi/4$		$(-\sqrt{2}/2, \sqrt{2}/2)$		**135**	69	36	18	9	6	3	3		**III**	[6][3](3]
III==000/0			0/III==000			$\sqrt{3}/2$	-1/2	$-\sqrt{3}$	$2/\sqrt{3}$	-II	$-\sqrt{3}/3$		$2\pi/3$		$(-1/2, \sqrt{3}/2)$		**120**	60	30	15	9	6	3	3		**III**	[6][3](3]
I	0	∞	I	∞	0	I	0	∞	I	∞	0		$\pi/2$		(0,1)		**90**	45	24	12	6	3	3			**III**	[6][3](3]
III==000/0	I/0	III==000	0/III==000	0	III==000/III	$\sqrt{3}/2$	1/2	$\sqrt{3}$	$2/\sqrt{3}$	II	$\sqrt{3}/3$		$\pi/3$		$(1/2, \sqrt{3}/2)$		**60**	30	15	9	6	3	3			**III**	[6][3](3]
II==0/0	II==0/0	I	II==0	II==0	I	$\sqrt{2}/2$	$\sqrt{2}/2$	I	$\sqrt{2}$	$\sqrt{2}$	I		$\pi/4$		$(\sqrt{2}/2, \sqrt{2}/2)$		**45**	24	12	6	3	3				**III**	[6][3](3]
I/0	III==000/0	III==000/III	0	0/III==000	III==000	1/2	$\sqrt{3}/2$	$\sqrt{3}/3$	II	$2/\sqrt{3}$	$\sqrt{3}$		$\pi/6$		$(\sqrt{3}/2, 1/2)$		**30**	15	9	6	3	3				**III**	[6][3](3]
						Opp/	Adj/	Opp/	Hyp/	Hyp/	Adj/					π [3Xx)	I	0	I	0	I	0	I	0	I		
						Hyp	Hyp	Adj	Opp	Adj	Opp					τ [6Xx)											

The fractional values of each trigonometric function provide a simple mapping to Prime notation. This table is the latest work in understanding how the fundamentals of CM translate to PM.

In the case of the 6 trigonometric functions (Sin,Cos,Tan and Csc,Sec,Cot) one may recognize that our expressions [3Xx) and [6Xx) provide a rudimentary method for mapping these functions as manifolds of π and τ – [6)[3)(3]

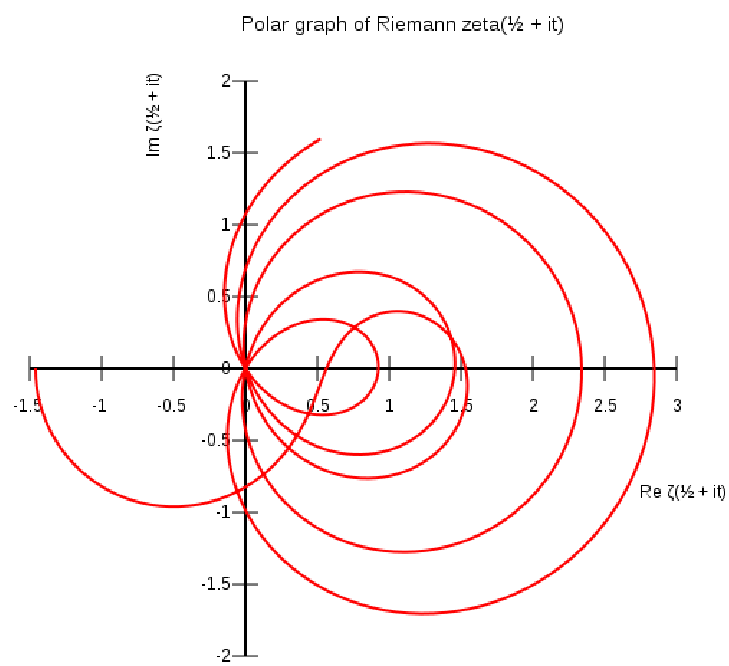
Version 1.1 of this intro features an early mapping of Prime notation to these fractional values (left-most column). This early work is experimental and may not represent the most effective form of the notation as the project develops.

Riemann Hypothesis

Let's take a giant leap now to one of the Millennium Problems of CM, the Riemann hypothesis. The Riemann hypothesis is based on the Riemann-Zeta function, and is defined below in more abstract terms:

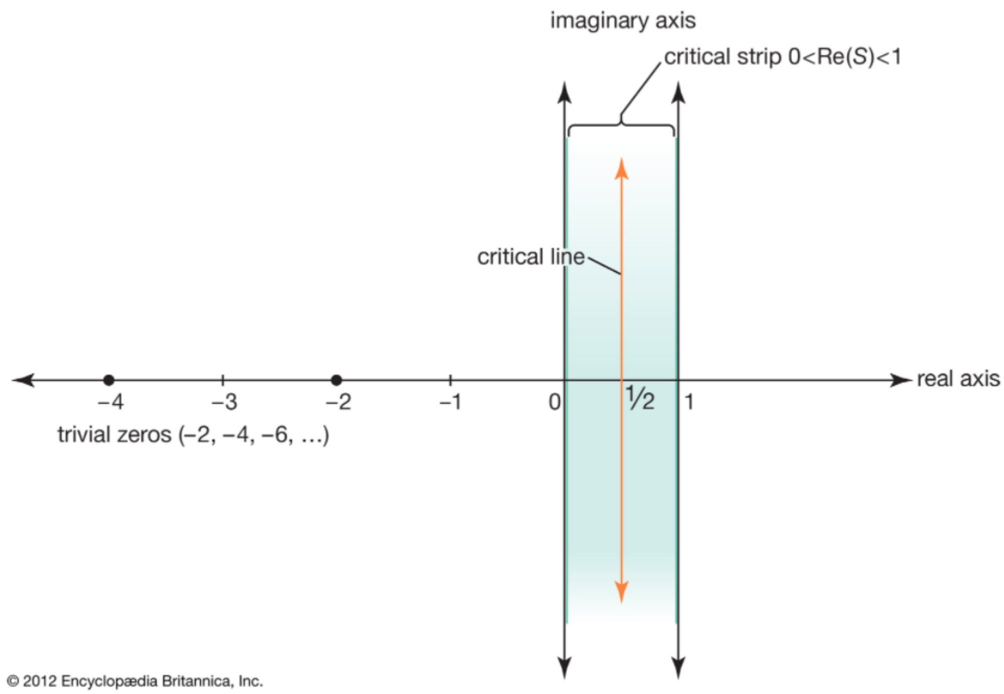
"In mathematics, the Riemann hypothesis is a conjecture that the Riemann zeta function has its zeros only at the negative even integers and complex numbers with real part 1/2. Many consider it to be the most important unsolved problem in pure mathematics. It is of great interest in number theory because it implies results about the distribution of prime numbers. It was proposed by Bernhard Riemann (1859), after whom it is named." (https://en.wikipedia.org/wiki/Riemann_hypothesis)

If we recall from page 18, Prime notation already gives us the ability to understand prime numbers from a fundamentally different perspective. Rather than focusing on the input values themselves, we see them as grouped iterations of the Prime value, π. Here we must remember that 1 and 0 will <u>always</u> represent π and τ.



(https://en.wikipedia.org/wiki/Riemann_zeta_function)

Perhaps a simpler way of understanding this function is that depending on the value we plug into the function, ζ(X), the result may be a trivial or non-trivial zero. A trivial zero refers to values lying on the X-axis to the left of the Y-axis, specifically negative even values (ζ(-2), ζ(-4), ζ(-6)…). The hypothesis states that all *non-trivial* zeros lie on the line X = ½. The image below may help with a visualization:



What is most important to know about the Riemann-Zeta function with respect to PM is that ζ(1) is undefined, or infinite. Knowing that I is π in PM, let's consider the values 0 and ½. We may immediately convert 0 to τ, but ½ gives us I/0. Where I0 is both I and III in PM, the line X = ½ forms a completely different identity within the logic base of PM. Fully converting this function to Prime notation is expected to provide a means for mapping the conventional four-quadrant system to the forward-diagonal expression of the Primer:

[II]

[I0)(0I]

[00)

While this paper provides a very brief introduction to how the Riemann hypothesis is understood at face value when using the logic of PM, a workbook is currently available on the project site that provides a much more in-depth mapping of how the notation is converted. For more information the reader may visit the Millennium Problems homepage: https://www.claymath.org/millennium-problems/riemann-hypothesis.

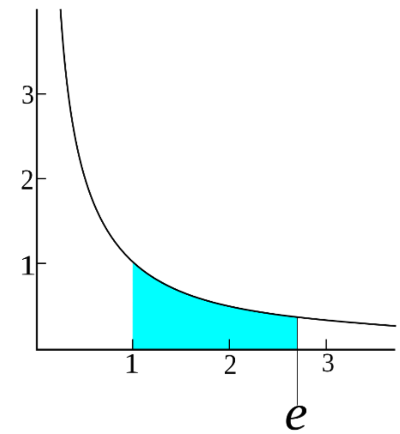
An additional page dedicated to this problem is being planned for the Prime Mechanics site as the work progresses. In learning to understand the Riemann Hypothesis, another important expression from CM has been reviewed – Euler's Identity.

Euler's Identity – Open Problem

While the Riemann-Zeta function provides a method for understanding how PM defines the zeros of CM, Euler's Identity may present an opportunity to understand how the π operator fully incorporates the irrational field. First let's understand how *e,* eponymously called Euler's Number, is defined:

$$e = \sum_{n=0}^{\infty} \frac{1}{n!} = 1 + \frac{1}{1} + \frac{1}{1 \cdot 2} + \frac{1}{1 \cdot 2 \cdot 3} + \cdots$$

e = 2.71828182845904523536028747135266249775724709369995…



In the above image (source: https://en.wikipedia.org/wiki/E_(mathematical_constant), the cutoff *e* gives the shaded surface an area of 1.

Now let's take a look at Euler's Identity:

$e^{i\pi} + 1 = 0$

As the base of the natural logarithm (ln), *e* may also be expressed as follows:

$\ln(e) = 1$

The open problem asks us to demonstrate, through Prime notation, that the identity $e^{i\pi} + 1 = 0$

is equivalent to the second law of PM: II == 0.

The identity itself is simple enough that it allows us to convert 1 and 0 to Prime notation immediately:

$e^{i\mathrm{I}} + \mathrm{I} = 0$

or

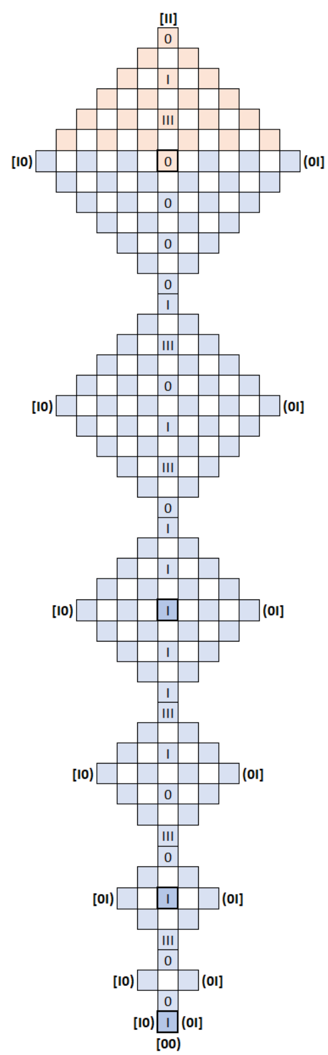
$e^{i\pi} + \pi = \tau$

In order to solve for II == 0, we must first state that $e^{i\pi}$ = I. A deeper understanding of both the trigonometric functions and the Riemann-Zeta function may aid in providing a solution to this problem. For a more detailed explanation of Prime notation and the III Laws, the reader is invited to visit the project site: www.prime-mechanics.com.

Euler's Identity	**Base-10 Radix**					**III Laws**
	III	3	6	9	000	III == 000
$e^{i\pi}+1=0$	0	**2**	5	8	II	**II == 0**
	I	1	4	7	00	00 == I
II == 0	0	'	''	'''		

The Axiom Project

The unoriginally named 'Axiom' project began as the draft for a sci-fi novel, in which a new language for understanding universal phenomena was conceptualized. While I may eventually finish that novel, PM began to take on a life of its own over the years. In the summer of 2020, after almost five years of independent research and development, Prime Mechanics was given its name based on the mapping of the Pi Calendar:



This visualization was the first mapping of the Primer [00)[I0)(0I][II] to one of the most basic expansions in CM, the Inverse-Square Law. By integrating the Periodic Table of Elements into this format with respect to the Primer, the Axiom project hit its first milestone in understanding the value of π as an operator.

Closing

Since 2015 all work on this project has been presented within the public domain. The current project vision may be summarized as follows:

--The mapping of Classical Mechanics and its disciplines through Prime notation

--The development of non-zero sum solutions for society in order to establish a more prosperous, collaborative and altruistic global community

--The empowerment of free thinking and free education beyond the influence of Institutional doctrine, supported by the sharing of valued open-source material

In time a separate paper is being considered that would explore the ego bias of Individuals, Cultures and Institutions within a historical and modern context across Abstract and Concrete disciplines. PM will remain open-sourced under the philosophy of free education, global collaboration and equality beyond the restrictions of these ego biases within modern society.