Meanderings: 3/18/22

The foundation of human mathematics is geometry. If one would take some time to look at the written works (they happen to be library available) of Newton, Kepler, and the time-tested Conic Treatise of Apollonius, you will be face to face with the stick art of human mathematics. However, unlike art, freedom of interpretation is not invited. Only a single path of rigorous logic leading to an irrefutable conclusion is proffered. Proofing still rules today, as the only way to structure an argument advancing human math to the next level.

For me, it is not important to understand the proofing used with exploratory Philosophical Geometry by the Masters for this can be as difficult to fathom as a triple integral proof. Simply witness the incisive descriptive language explaining methods used by these great geometers of our past, Huygens, Newton, and Kepler, to name a few, as they ponder Questions of Natural Phenomena of Being using descriptive mathematical relations between lines and curves with the unique irrefutable perspective of picture perfect classic geometry.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC

The science of curved space parametrics (2).

Constructing inversed exponent (roots) of Cartesian domain integers part1.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC

If we want to learn how to construct curved space mechanical energy of central force fields, it is necessary to learn the shaping phenomena of exponents in square space and inversed exponents of curved space.

The science of curved space parametrics. A STEM accelerator	November 28 2021

A parametric tool for curved space analytics of SCALAR Cartesian number line counting integers.

A presentation of exponents and roots. Changing the shape of space curves.

Began: Sunday, November 28, 2021.01:13.

~~Completed~~ Thursday, February 17, 2022. 05:47.

16 pages; 2116 words. Completed Friday, March 11, 2022. 02:35.

On written symbols and digital code for roots and exponents..

Exponents are straight forward $(number^{exponent})$. Roots have an alternate script and symbol. Given we know the $(3^3 = 27)$. We also recognize $\left(\sqrt[3]{27} = 3\right)$. But not so often used is the written exponent for $\left(\sqrt[3]{27}\right)$; $\left(27^{\frac{1}{3}} = 3\right)$. Note the inverse of exponent (3) in the examples is cube root or $\left(\frac{1}{3}\right)$. Using inverse exponents eliminates the radical.

There are three elements in the parametric geometry of roots: index; radical; and radicand. $\sqrt[index]{radicand}$.

We never include the index when writing square roots. Why? Don't know! Anyway, the correct written term for square root of 4 is: $\left(\sqrt[2]{4} = 2\right)$. *Or* $\left(4^{\frac{1}{2}}\right)$.

When constructing curved space parametric solution curves finding counting integer roots on a Cartesian domain number line in 2-Space, I reference the index and radicand as the main components composing parametric solution curves.

We also have seldom seen exponents.

$$(n^0 = 1);\ (n^1 = n)$$

Setting these exponents $(0\ and\ 1)$ *at radical index:*

$\left(\sqrt[1]{n}\right) = n,$ and $\left(\sqrt[0]{n}\right) = (\frac{1}{0}$ indeterminate infinity encountered).

When I was in school, we simply forbade thinking a (0) denominator. Now we claim (indeterminate infinity)?? Curved space parametric geometry *will* provide a construction of $\left(\sqrt[0]{n}\right)$. A parametric curved space system having range without domain. A strange beast, but one hell of an interesting range intercept with the parametric dependent curve composing registration of the domain counting integer playing the part of the $(radicand)$.

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USING A (CSDA©) TO CONSTRUCT ROOTS OF MAGNITUDE:

PROBLEM1: Construct the $\sqrt[2]{2}$:
I will use a Euclidean perpendicular divisor to find exact and precise median of magnitude. The median will provide the radius of the unit circle with which to build the unit parabola. As in calculus, I will use methods that “flex” a curve by changing the definition curve (aka dependent curve) *exponent*. In so doing I create a solution curve to intercept the Latus Rectum number line at the desired radicand index I seek.

PowerPoint Informative (parametric upgrade for EUCLID’S ⊥ divisor).
2013 MATHFEST, HARTFORD CONNECTICUT

All my roots of magnitude constructions begin with Euclid’s perpendicular divisor.

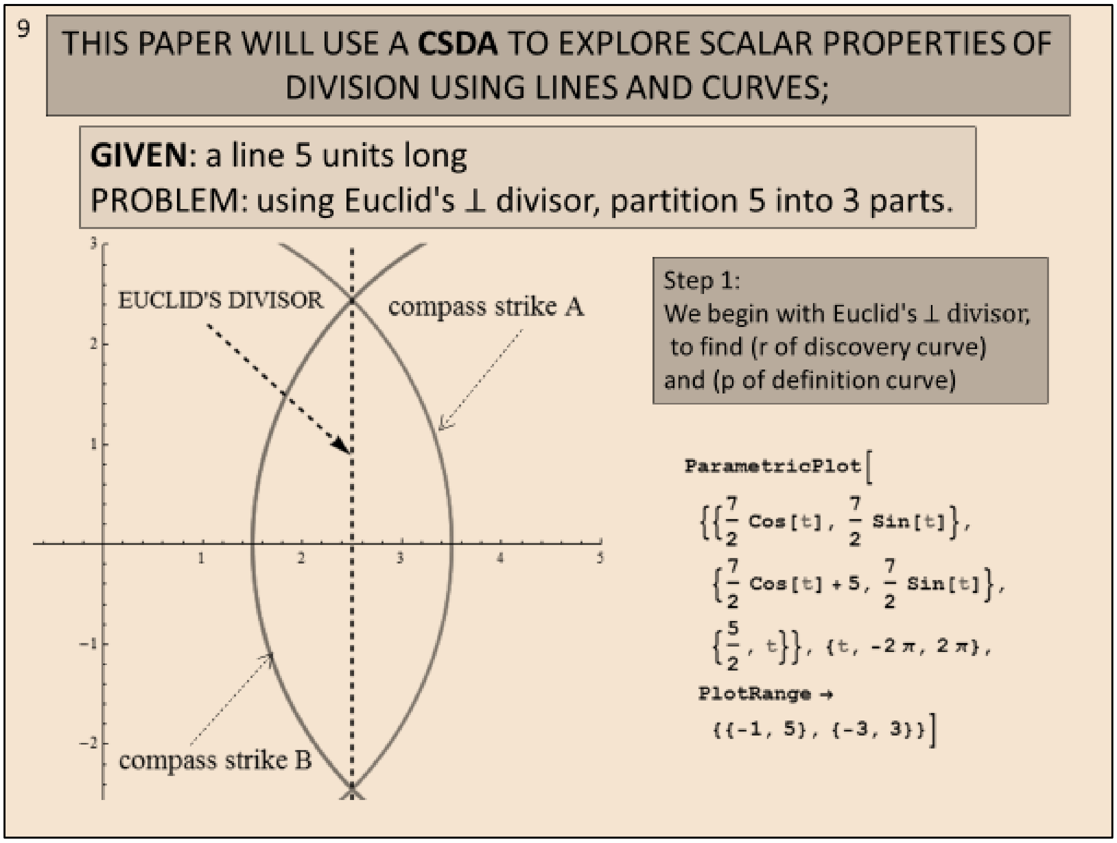


Figure 1; utility of Euclid’s Perpendicular Divisor: Step 1; set a compass greater than half considered magnitude. Step 2; set compass point on magnitude ends and strike arc (A) and (B). Step 3; use straight edge connection of arc intercepts to find <u>midpoint</u> of any magnitude.

I've changed the moniker of independent curve to discovery and dependent curve to definition.

We can now use computer based parametric geometry to construct $(\sqrt{2})$. After which I will post methods to construct roots of any magnitude.

I find the desired root on our number line with a root abscissa ID; then construct curved space intercept, confirming agreement between square space math and curved space math root solution curves and the abscissa index ID.

Sand Box Geometry construction $(\sqrt[2]{2})\ or\ \left(2^{\frac{1}{2}}\right)$.

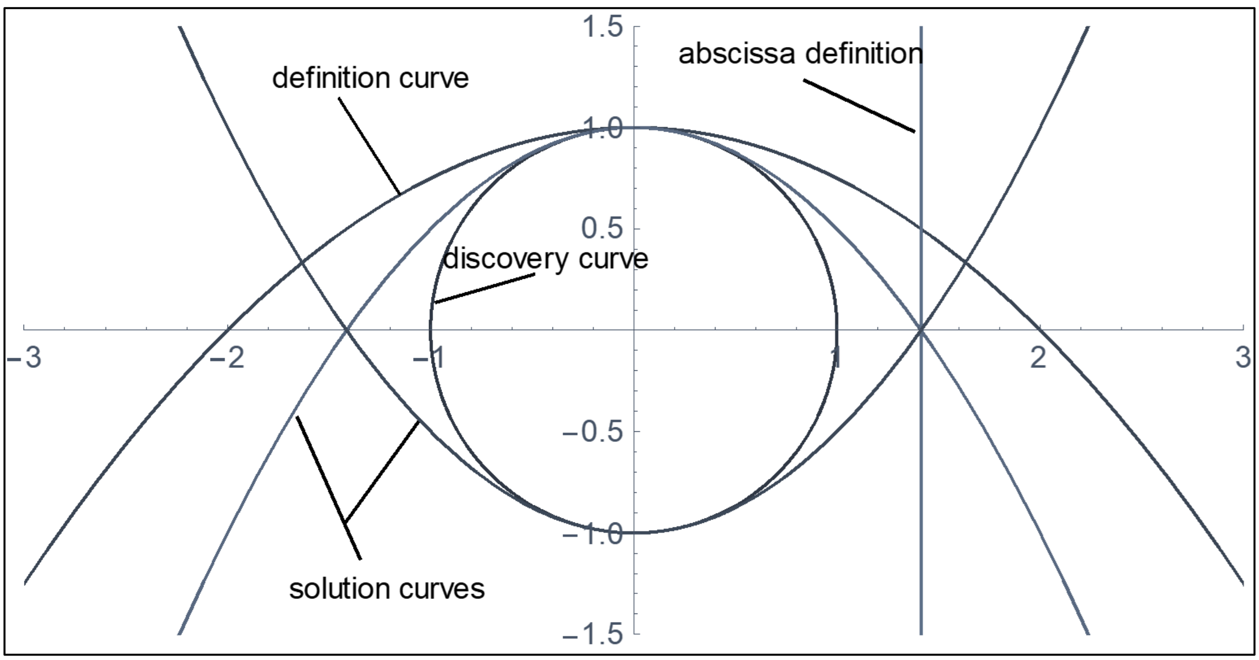


Figure 2: A curved space construction for $(\sqrt[2]{2})$. we have the discovery curve, the definition curve, square space abscissa definition and curved space solution curves.

I call the unit circle and unit parabola a unit moniker because the curves are constructed using a pre-determined unit of square space: (Euclid's magnitude/2). Half to discovery and half to definition.

These are the methods to construct roots of magnitude.

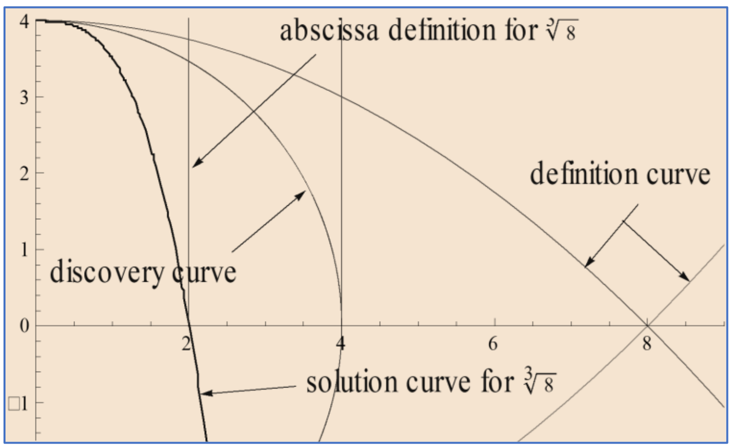
- Divide the considered magnitude in half to find the discovery radius. With the discovery radius construct a dependent parabola definition curve to register magnitude (radicand/integer) location on Cartesian square space number line with the **CSDA** parametric machine.
- Independent (DISCOVERY) curve parametric description: $\left(\frac{magnitude}{2} Cos\,[t], \frac{magnitude}{2}\ Sin[t]\right)$.
- Dependent (DEFINITION) curve parametric description: $\left(t, \frac{t^2}{-4(p)} + r\right)$, where (*p*) = (*r*: $\frac{magnitude}{2}$) of discovery curve.
- Solution curves for roots of magnitude:

$$\{t, \left(t^{index}/\mp 2\right) \pm (radicand/2)\}$$

Parametric geometry means to construct $(\sqrt[3]{8})$.

Sand Box Geometry Demonstration on roots of magnitude; construct$(\sqrt[3]{8})$.

$$\text{ParametricPlot}[\{\{\frac{8}{2}\text{Cos}[t],\frac{8}{2}\text{Sin}[t]\},\{t,\frac{t^2}{-4\left(\frac{8}{2}\right)}+\frac{8}{2}\},\{t,\frac{t^2}{+4\left(\frac{8}{2}\right)}-\frac{8}{2}\},$$
$$\{t,\frac{t^3}{-2}+\frac{8}{2}\},\{\sqrt[3]{8},t\},\{4,t\}\},\{t,0,6\pi\},\text{PlotRange}\rightarrow\{\{0,9\},\{\frac{-3}{2},4\}\},$$



Proof that the solution curves are at$(\sqrt[3]{8})$.

We see $\{t \rightarrow 2\}$is one of the roots.

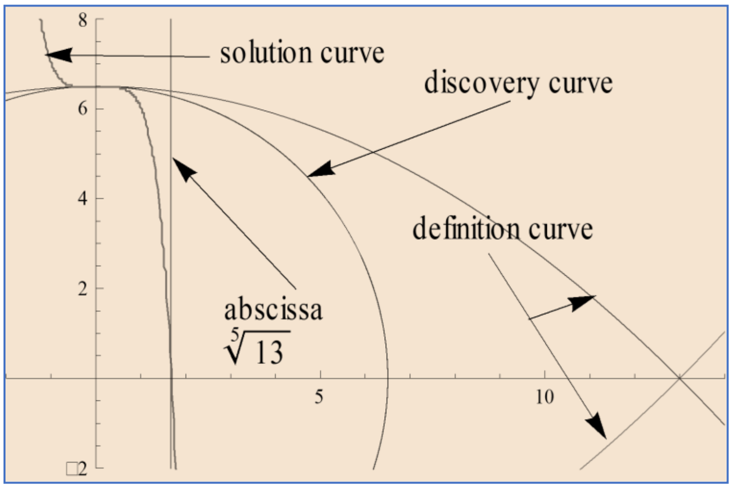
$$\text{Solve}\left[\frac{t^3}{-2}+\frac{8}{2}==\frac{t^3}{+2}-\frac{8}{2},t\right]\xrightarrow{yields}$$
$$\{\{t\rightarrow 2\},\{t\rightarrow -2(-1)^{1/3}\},$$
$$\{t\rightarrow 2(-1)^{2/3}\}\}$$

I reject other root solutions as I am only interested in 1st quad positive intercept of Cartesian number domain.

My last demonstration will be to construct: $(\sqrt[5]{13})$.

The parametric description will be:

$$\text{ParametricPlot}[\{\{\frac{13}{2}\text{Cos}[t], \frac{13}{2}\text{Sin}[t]\}, \{t, \frac{t^2}{-4\left(\frac{13}{2}\right)} + \frac{13}{2}\}, \{t, \frac{t^2}{4\left(\frac{13}{2}\right)} - \frac{13}{2}\}, \left\{t, \frac{t^5}{-2} + \frac{13}{2}\right\}, \{\sqrt[5]{13}, t\}\}, \{t, -2, 6\pi\}, \text{PlotRange} \to \{\{-2,14\}, \{-2,8\}\}]$$



The Curved Space Division Assembly construction for the $(\sqrt[5]{13})$.

Proof that the solution curves are at the fifth root of 13.

$$\text{Solve}[\frac{t^5}{-2} + \frac{13}{2} == \frac{t^5}{+2} - \frac{13}{2}, t] \xrightarrow{yields} \{\{t \to -(-13)^{1/5}\}, \{t \to 13^{1/5}\}, \{t \to (-1)^{2/5}13^{1/5}\}, \{t \to -(-1)^{3/5}13^{1/5}\}, \{t \to (-1)^{4/5}13^{1/5}\}\}$$

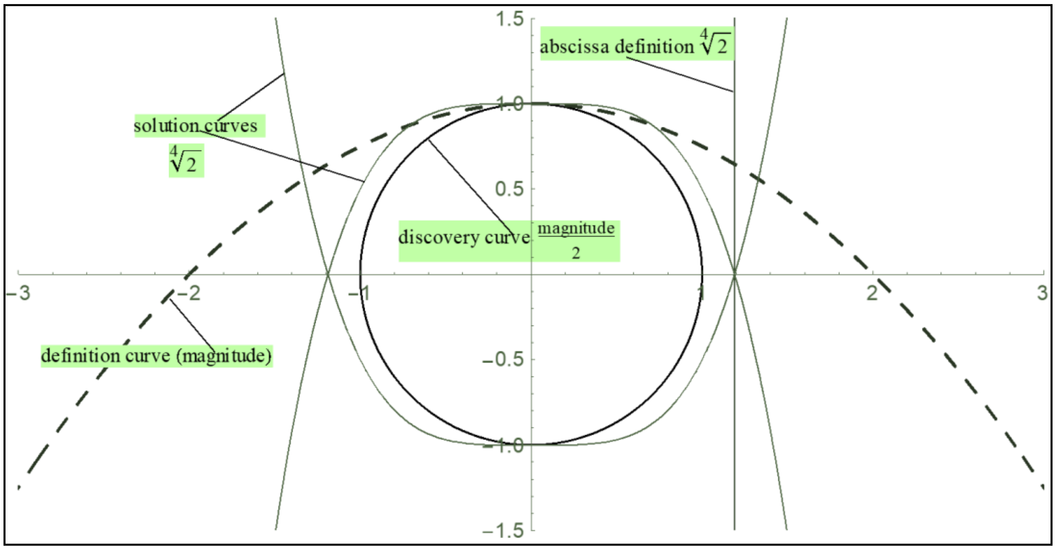
We see that one solution is $(t \to 13^{1/5})$, proof complete… ALΣXANDΣR

Gauss Fundamental Theorem of Algebra determines number of solution terms a polynomial has by highest degree exponent. $\{\sqrt[5]{13}, t\}$ has 5 inversed exponents:

$\left(let\ \left(13^{\frac{1}{5}}\right) = n\right)$ then $(n^5) = 13$. Solution requires 5 equal multipliers. Gauss zeros a polynomial for solution term(s). Curved space zeros slope of solution curves to fall precisely on root(index) of a **CSDA** domain integer.

Curved space construction of $(\sqrt[4]{2})$; to see the changing shape of even indices solution curves.

$$\text{ParametricPlot}[\{\{\text{Cos}[t], \text{Sin}[t]\}, \{t, \frac{t^2}{-4(1)} + 1\}, \{\sqrt[4]{2}, t\}, \{t, \frac{t^4}{-2} + \frac{2}{2}\}, \{t, \frac{t^4}{+2} - \frac{2}{2}\}\}, \{t, -\pi, \pi\}, \text{PlotRange} \to \{\{-3,3\}, \{\frac{-3}{2}, \frac{3}{2}\}\}]$$



We see that *even* indices solution curves are parabolic shaped.

Figure 3: Curved Space Construction for $\sqrt[4]{2}$.

Curved space construction of $\left(\sqrt[5]{3}\right)$; to see the changing shape of odd indices solution curves.

$$\text{ParametricPlot}[\{\{\tfrac{3}{2}\text{Cos}[t],\tfrac{3}{2}\text{Sin}[t]\},\{t,\frac{t^2}{-4\left(\frac{3}{2}\right)}+\frac{3}{2}\},\{t,\frac{t^5}{-2}+\frac{3}{2}\},\left\{t,\frac{t^5}{+2}-\frac{3}{2}\right\},\{\sqrt[5]{3},t\}\},\{t,-3\pi,3\pi\},\text{PlotRange}\rightarrow\{\{-4,4\},\{-2,2\}\},\text{AxesOrigin}->\{0,0\}]$$

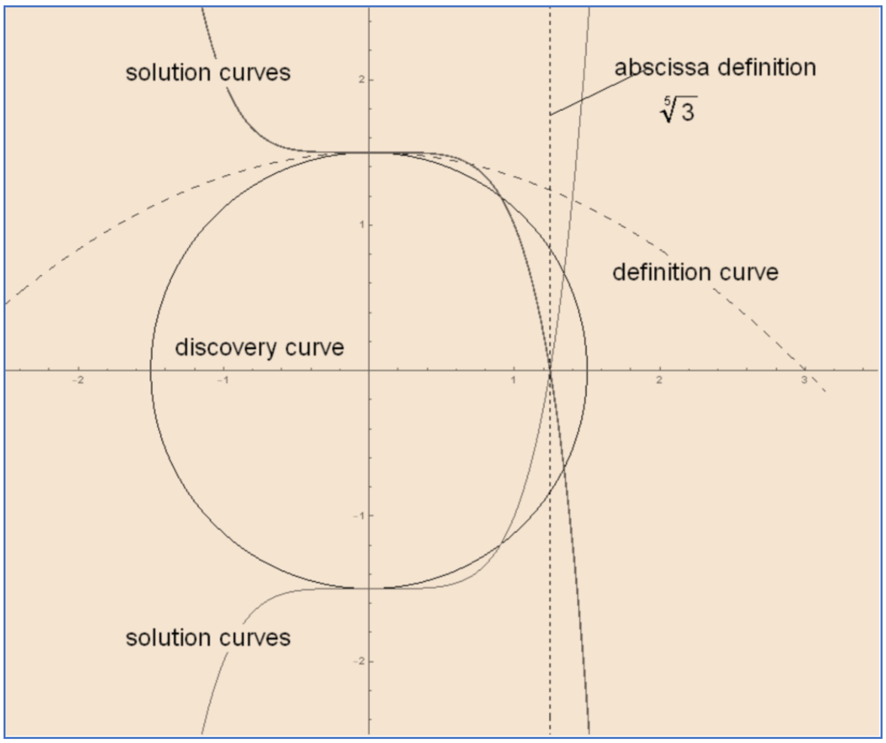


Figure 4: Curved Space Construction for $\sqrt[5]{3}$.

Note: both solution curves $(+\&-, odd\&even)$ always pass through independent $\left(\frac{\pi}{2};\ 90°; N\right)$ & $\left(\frac{3\pi}{2}; 270°; S\right)$ spin vertices of **CSDA** parametric machine with flatline (zero slope). Square space math zero's a polynomial to find roots, curved space zeroes slope. The spin angles of an analytical **CSDA** profile sphere are 90˚ and 270˚. Vertices N & S. N is (π/2), and S is $\left(\frac{3\pi}{2}\right)$. Rotation diameter end points also have definition. Rotation diameter of a parametric **CSDA** is found as a chord of the dependent parabola curve, the system Latus Rectum parabola chord with ends E & W. W is (π; 180°) and E is (0°or 2π; 360°).

These four radian angles are the only radian description used by the Sandbox.

<u>*Spin*</u>: N: (π/2 = 90°); S: $\left(\frac{3\pi}{2} = 270°\right)$. <u>*Rotation*</u>: W: (π = 180°); E: (0°or 2π; 360°).

EVEN INDICES $\sqrt[4]{2}$

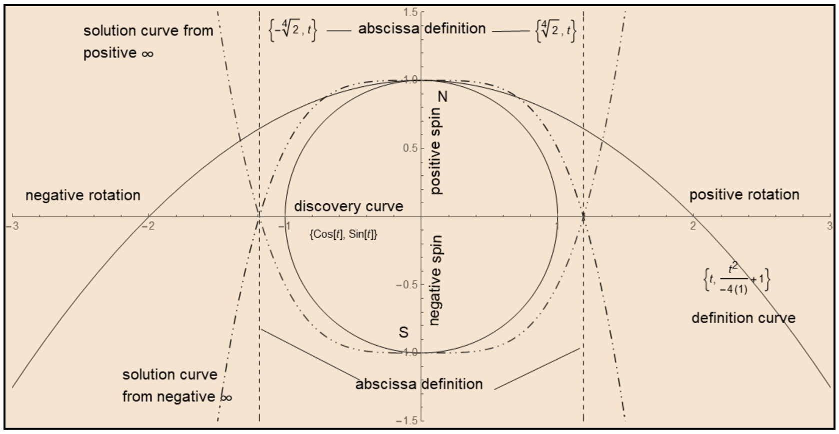


Figure 5: **CSDA** curved space construction of even indices for roots of magnitudes.

Even indices seem to favor two root abscissa ID. One on negative side of discovery curve domain and one on the positive side of discovery domain.

ODD INDICES: seem to favor one root abscissa ID on the positive side of discovery domain.

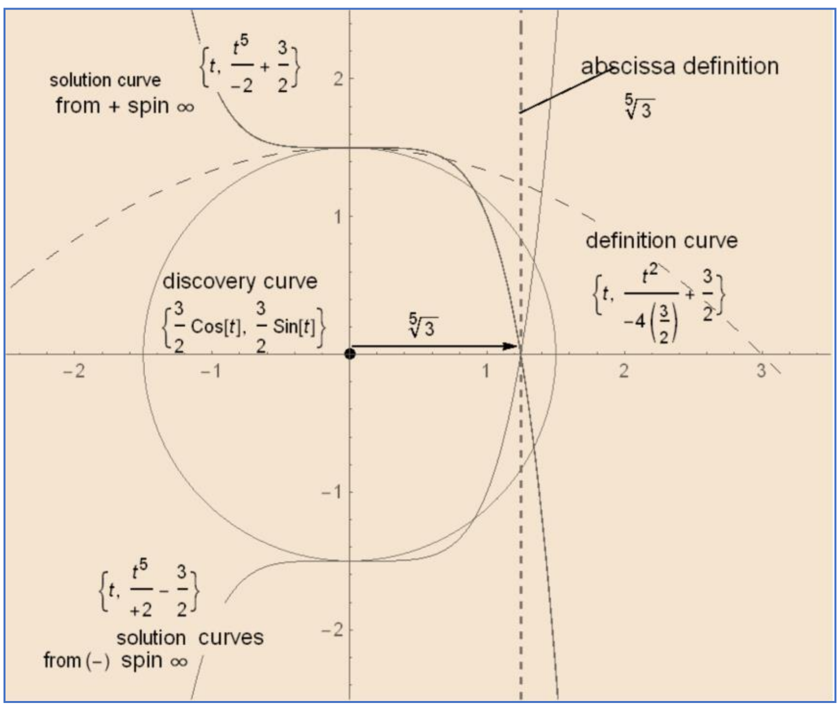


Figure 6: **CSDA** construction defining shape of odd indices.

on signing CSDA spin-rotation space:

($\pi/2 = 90°$): Positive (y) is positive spin sourced from positive side of accretion domain of **F**.

$\left(\frac{3\pi}{2} = 270°\right)$: Negative (y) is negative spin sourced from negative side of accretion domain of **F**.

($\pi = 180°$): Negative (x) is negative side of accretion.

($0°$or 2π; $360°$): Positive (x) is positive side of accretion.

END CSDA© MATH OPERATIONS: DIVISION AND ROOTS OF MAGNITUDE.

ALΣXANDΣR

PART2: Exploring $(\sqrt[2]{9})$, $(\sqrt[1]{9})$, $(\sqrt[0]{9})$. 3/9/22. <u>23:38</u>.

Going from square space +domain counting integer roots to curved space solution curves working the same problem of indexing a radicand can only be done with human imagination and parametric geometry.

A central force profile of a degree3 field energy shape rotates system (domain) using spin (range) as locator for system point mass center (F).

Parametric geometry construction for $(\sqrt[2]{9})$. <u>Construction@GTG, roots2019,9root.nb</u>

Root construction on spin and rotation of Energy Field domain is done using the $(+\,side)$ system latus rectum as a position vector investigation. I use the dependent $(unit\ parabola)$ curve focal radius aka (position vector) to bring integer(radicand) of inquiry unto **CSDA** registration for root(s) constructions.

$$\text{ParametricPlot}[\{\{\tfrac{9}{2}\text{Cos}[t],\tfrac{9}{2}\text{Sin}[t]\},\{t,\frac{t^2}{-4\left(\frac{9}{2}\right)}+\frac{9}{2}\},\{t,\frac{t^2}{-2}+\frac{9}{2}\},\{t,\frac{t^2}{+2}-\frac{9}{2}\},\{\sqrt[2]{9},t\}\},\{t,-3\pi,3\pi\},$$
$$\text{PlotRange}->\{\{\frac{-9}{2},9\},\{-9/2,9/2\}\},\text{AxesOrigin}->\{0,0\}]$$

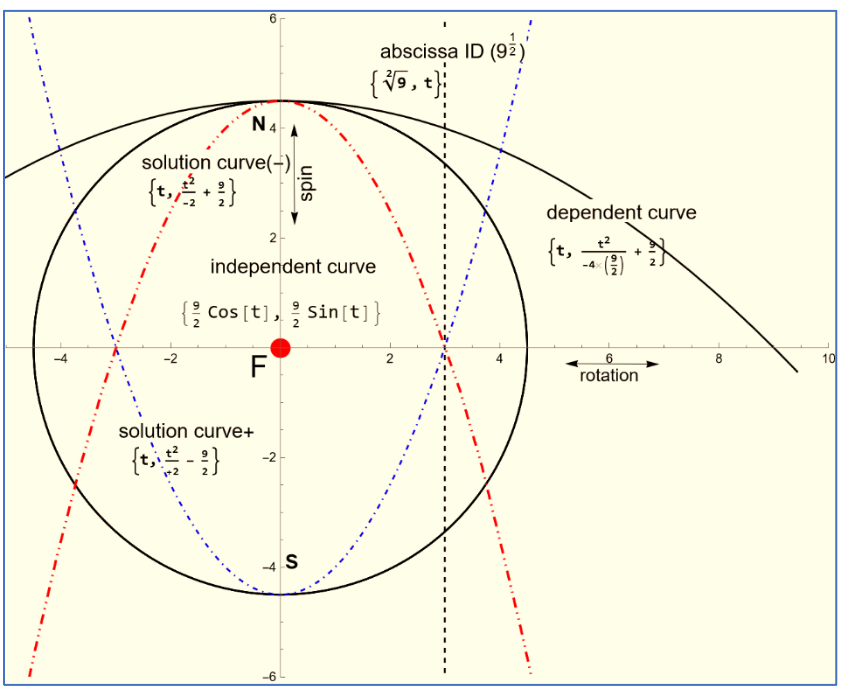


Figure 7: square space and curved space finding $(\sqrt[2]{9})$. (GtG; roots 8221; GeoGebra CSDA roots2).

I color two solution curves. Blue is $(1st\ quad(+)\ )$ and red is $(1st\ quad(-))$. I sign the solution curves using slope happening @ 1st quad root abscissa definition. Behavior is always the same. Both curves approach **CSDA** spin axis from quads (2&3), red to N from (3), and blue to S from (2). Flatline at poles, then find the required solution on the rotation domain of field.

Spin is Rotation for nuclear **CSDA** analytics and Rotation is Accretion for G-field analytics.

Parametric geometry construction for $\left(\sqrt[1]{9}\right)$. Construction@GTG, roots2019,9root.nb

Interesting construction. I imagine a G-field assembly where (M_1) uses a position vector to define available orbit energy for stable (M_1M_2) orbit parameters. (M_1) does so by placing a position vector investigation at that place in time and space where (M_2) range of motive energy $\left(f(r)\right)$ is found to be $(radicand(n), 0)$. Establishing Linear root solution curves $(+ \; and \; -)$ degree1 curved space intercept with desired integer index. A two-pronged pinpoint of motive energy center on the period time curve of (M_2) with respect to (M_1) spin. A central force presentation of two unity ***energy*** curves for sustainable orbit motion.

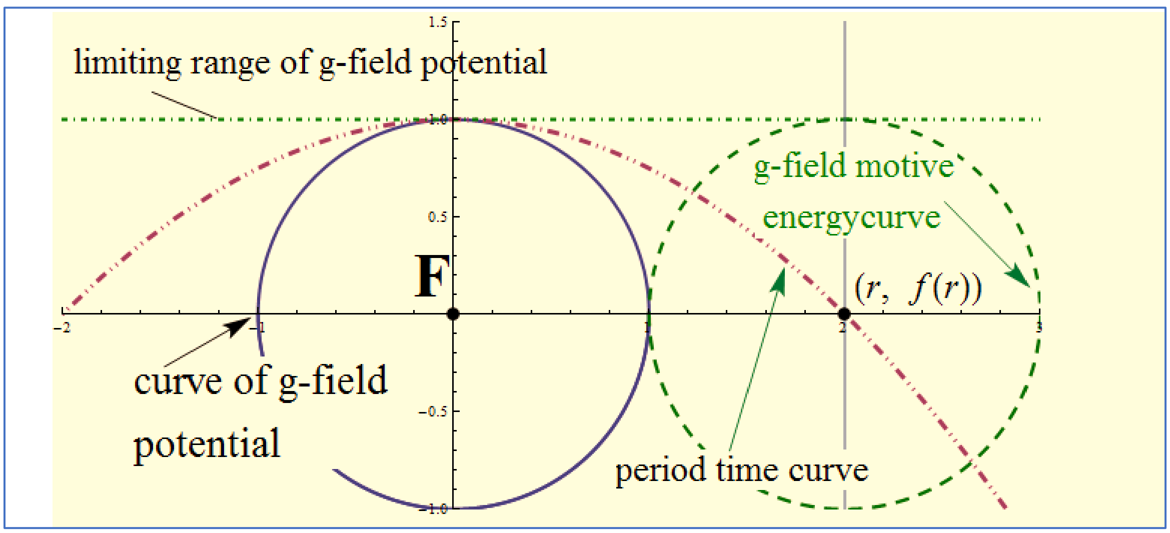


Figure 8: 2014 JMM presentation.

UNITY CURVES: PROPOSAL; let there be two curves composing a zero-sum philosophy describing orbit energy exchange between $(M_1 \leftrightarrow M_2)$.

1ST CURVE IS POTENTIAL: a FIXED, CLOSED unity curve (curvature and radius of curvature = 1) centered about F.

2nd curve is inverse square motive properties of (M_1) potential, ORBIT MOMENTUM, centered as displacement radius (r) of Sir Isaac Newton. $(r\, f\, (r))$ registered as a second unity curve on domain of (F) having parametric analytical happenings when etangent slope is a $(\pm\, 1\; event)$ on the period time curve of (M_2).

Since energy exchanged between these two curves determines orbit momentum, we need two equal energy curves to *initialize* and quantify available energy to share, when added together zero balance the exchange for stable orbit motion. Somewhere, on the period time curve, there will be a motive energy curve of same shape as potential less the (mass/volume) content. Enter the latus rectum as average orbit diameter of a **CSDA** system. Here we find the reference level of gravity field orbit energy curves. It is here, and only here, on the average diameter of an orbit can two unity curves co-exist.

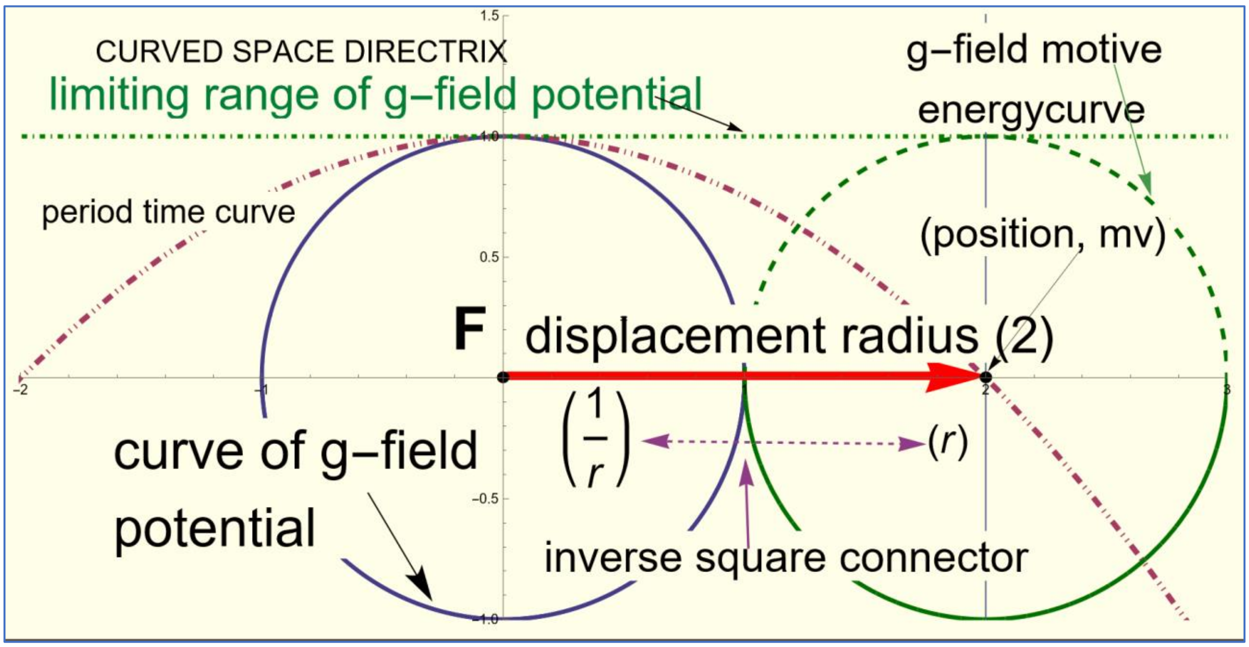


Figure 9: JMM2014: CIRCULAR ENERGY CURVES OF GALILEO AND GRAVITY FIELD MOTION OF OUR PLANET GROUP.

Deeper investigation(s) of the previous $(M_1 M_2)$ explanatory is reserved for exploration of Sir Isaac Newton's $(S\&T2)$.

Essential of $(M_1 M_2)$ orbit energy exchange allow a philosophical reasoning for Parametric geometry construction for $(\sqrt[1]{9})$ on a central force energy field.

Parametric geometry construction for $\left(\sqrt[1]{9}\right)$.

$$\text{ParametricPlot}[\{\{\tfrac{9}{2}\text{Cos}[t],\tfrac{9}{2}\text{Sin}[t]\},\{t,\frac{t^2}{-4\left(\frac{9}{2}\right)}+\frac{9}{2}\},\{\sqrt[1]{9},t\},\{t,\frac{t^1}{-2}+\frac{9}{2}\},\{t,\frac{t^1}{+2}-\frac{9}{2}\}\},\{t,-3\pi,3\pi\},\text{PlotRange}\to\{\{-5,10\},\{-6,6\}\}]$$

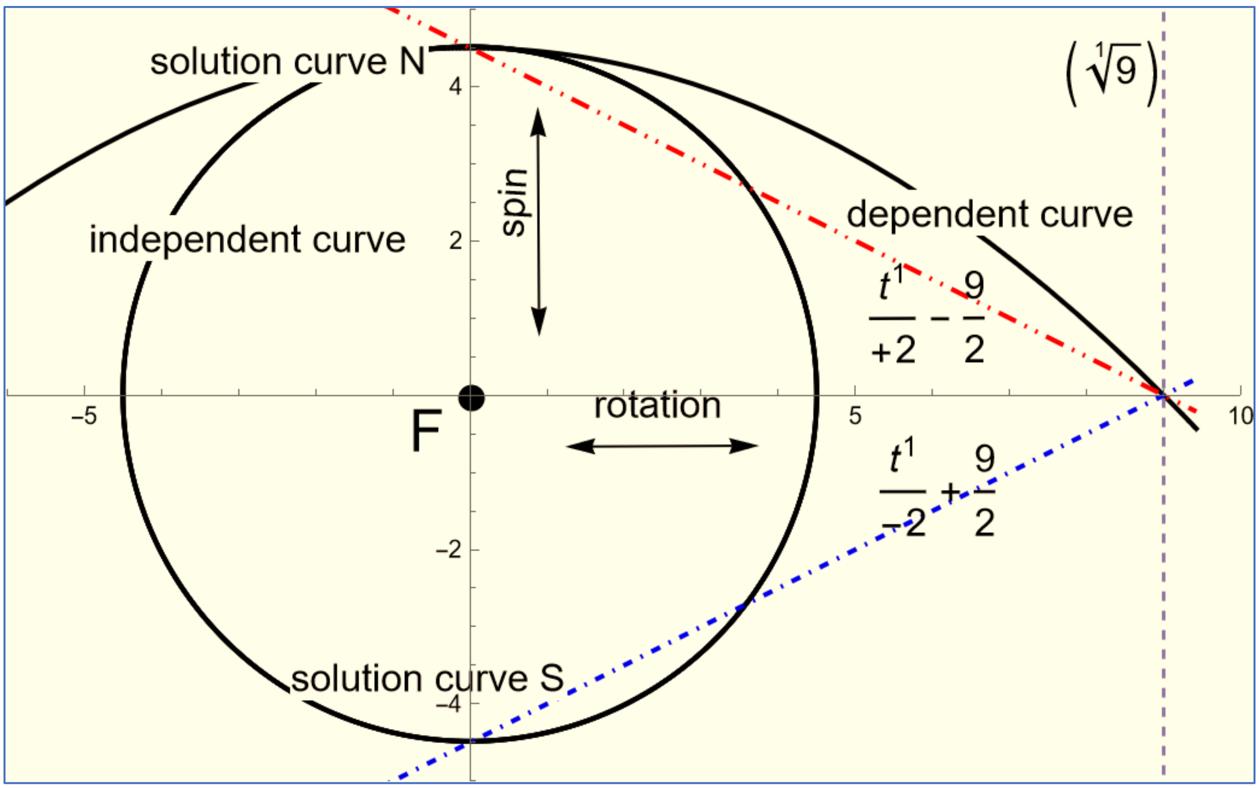


Figure 10: CSDA construction for $\sqrt[1]{9}$ on Central Force Field domain.

Note slope of both solution curves are linear: $\left(\pm\frac{1}{2}\right)$. Such slope distributes Central Force energy in equal proportion. Half to potential half to motive(e). Note numerator of the dependent part of solution curves carry a degree1 exponent:

$\left(t,\frac{t^1}{\mp 2}\pm\pm\frac{9}{2}\right)$.

1st root of 9 is 9: $\left(\left(\sqrt[1]{9}\right)=9\right)$.

Linear solution curves of **F**, register domain counting integers with pinpoint accuracy using their slope to intercept (M_2) $(f(r))$ at $(0\ f(r))$. (M_1) uses this 1st degree root solution description as placement for a position vector investigation of slope happenings on the period time curve of (M_2) to quantify system mechanical energy for sustainable $(M_1 M_2)$ orbit parameters *at event* $(m = \pm 1)$.

Note solution curve(s) behavior with respect to spin axis pole identity of (M_1).

Blue is $(1st\ quad(+))$ and red is $(1st\ quad(-))$. I sign the solution curves using slope happening @ 1st quad root abscissa definition. Behavior is always the same. Both curves approach **CSDA** spin axis from quads $(2\&3)$, red to N from (3), and blue to S from (2).

Linear solution curves do not flatline. Only degree2 curves can change shape to acquire a $(m = 0)$ flatline attitude.

Parametric geometry construction for $\left(\sqrt[0]{9}\right)$. Construction@GTG, roots82021, roots of curvedspace square space

I have eliminated $\left(\sqrt[0]{9}\right)$ from parametric arguments $(on\ my\ Wolfram\ .nb\ )$ because a domain abscissa does not exist and indeterminate exasperation by the computer does!! I include $\{\sqrt[2]{9}, t\}$ as only place curved space range parameters can find comfort because this is the last known address of a degree2 curve intersection by range and domain producing index (2) solution curves for square space radicand (9).

A domain decision for $\left(\sqrt[0]{9}\right)$ might not exist but the range part of Central Force mechanical energy can. Potential is not potential if not working, only rest energy. $\left(index(0)\right)$ solution curve presents presence to (M_1), by intercept with the system dependent curve at the last known *index* $(degree2\ )$ index root inquiry for counting integer (radicand) having both a domain and range definition for index (2).

$$\text{ParametricPlot}[\{\{\{\tfrac{9}{2}\text{Cos}[t], \tfrac{9}{2}\text{Sin}[t]\}, \{t, \frac{t^2}{-4\left(\frac{9}{2}\right)} + \frac{9}{2}\}, \{\sqrt[0]{9}, t\}, \{t, (\frac{t^0}{-2} + \frac{9}{2})\}, t, \frac{t^0}{+2} - \frac{9}{2}\}, \{\sqrt{9}, t\}\}, \{t, -3\pi, 3\pi\}, \text{PlotRange} \to \{\{-5,10\}, \{-6,6\}\}]$$

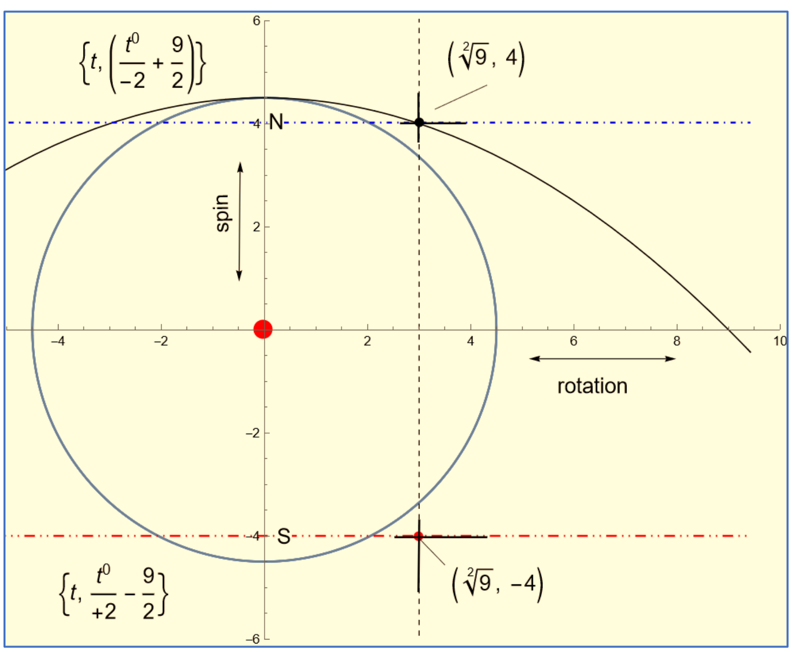
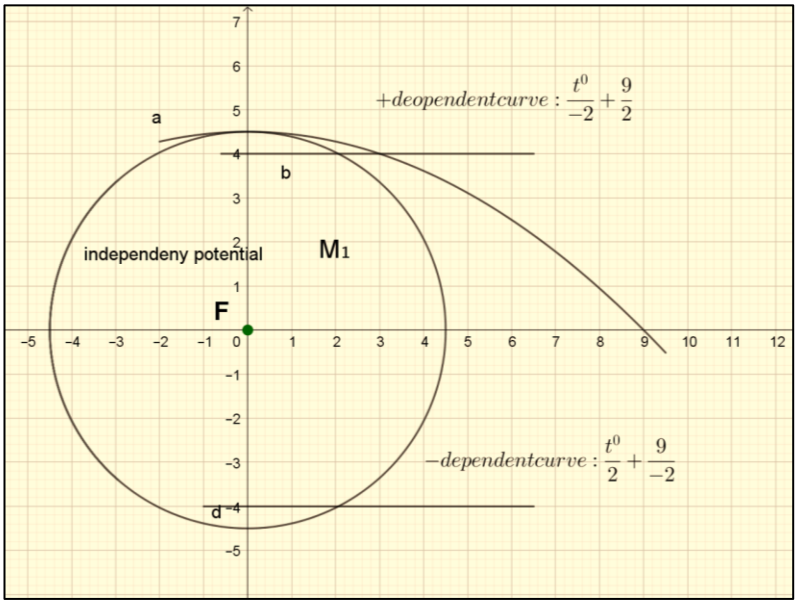


Figure 11: A **CSDA** inquiry for $\left(\sqrt[0]{9}\right)$

What's happening? First of all, both curves have $(0\ slope)$. Both solution curves are held tight within the bounds of **F** as rest energy. When solution curves operate at central force poles, potential of **F** comes alive! Both solution curves run parallel with accretion.

Both solution curves $\{t, \left(\frac{t^0}{\mp 2} \pm \frac{9}{2}\right)$ present a solution event for range part of system.



The dependent part of curved space *can* compute the $(0\ index)$ used as exponent (t^0) in the solution parameters for $(\sqrt[0]{9})$, the answer being (± 4).

So, solution curves seek a range place on the Central Force spin axis called (± 4).

There is one and only one domain discovery for solution curve(s) inquiry on the dependent curve at the range place called (± 4).

$$(\sqrt[2]{n}).$$

I say when Cartesian number line integers are used as index for root(s) of counting integers, a **CSDA** central force root solution curves exist, including place holder (0).

When (0) is used as index, solution curves of index (0) define the last known degree2 solution curve radicand integer (n).

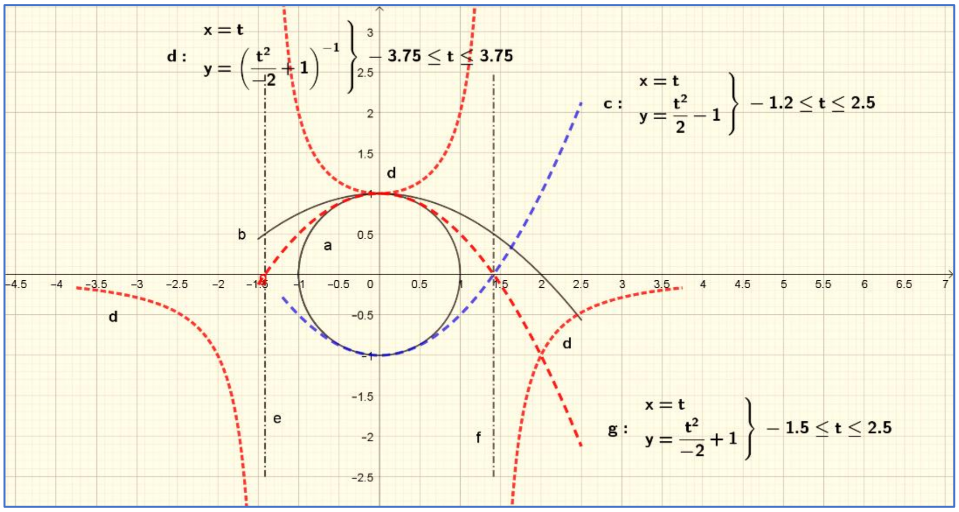
This is the last known inversed exponent of *curved* space. (t^1) is linear and not truly a curve, though lines are considered curves by?? And $(\sqrt[0]{t})$ is without Domain definition, clearly forbidden $\left(t^{\frac{1}{0}}\right)$ has $(0\ INNA'\ DENOMINATOR!!!)$ What else is a Central Force solution curve to do but find the last known $\left(t^{\frac{1}{2}}\right)$ for a domain Espiritu.

QED: $ALΣXANDΣR;\ CEO\ SAND\ BOX\ GEOMETRY\ LLC$

Thursday, February 17, 2022. <u>04:24</u>.

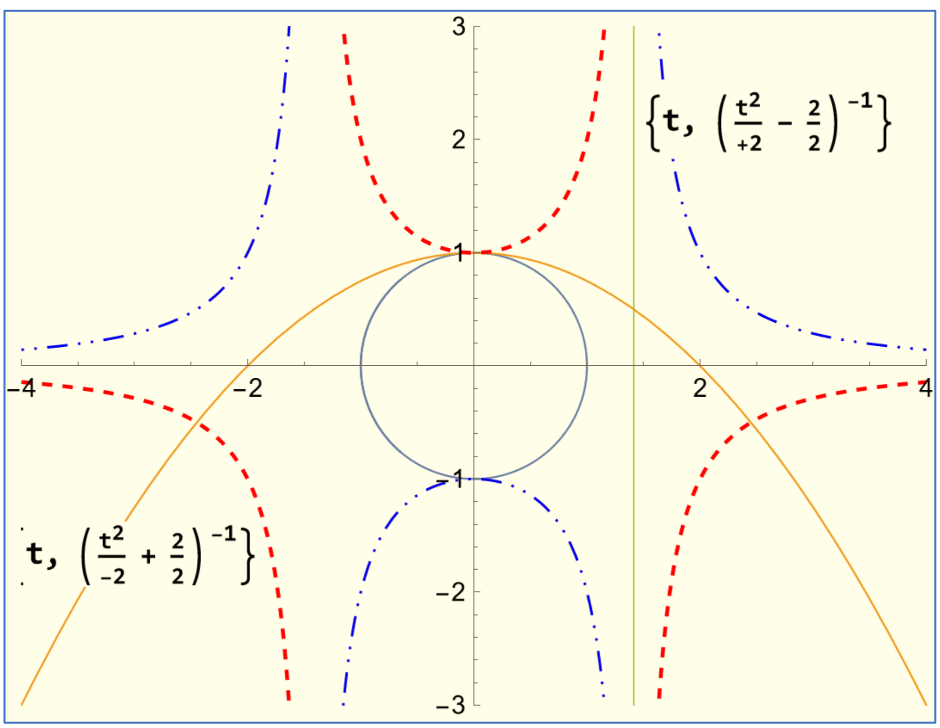
Why would we want to construct roots on a spinning central force domain?

Because a deeper sense of Central Force natural ME can be reached. It's a deep place to go when one takes the dependent part of solution curves and inverts the dependent composition of integer roots:
investigating solution curves for $\left(\sqrt[2]{2}\right)$.



Note: solution curves (c and g) pass through independent $\left(\frac{\pi}{2};\ 90°; N\right)$ & $\left(\frac{3\pi}{2}; 270°; S\right)$ with flatline (zero slope). (c) is blue $(+)$ and (g) is red $(-)$.

GeoGebra parametrics has inverse exponent for negative solution curve (g). The inverse curve (d) vertex remains in contact with solution for $\left(\sqrt[2]{2}\right)$ curve (g). Curve (d) has 3 parts, separated via asymptotes $\left(\pm\sqrt[2]{2}\right)$.



My Wolfram construction is inverse exponents only, no $\left(-\sqrt[2]{2}\right)$ asymptote.

Further investigation of central force inverse exponent curve will be forthcoming.

ALΣXANDΣR

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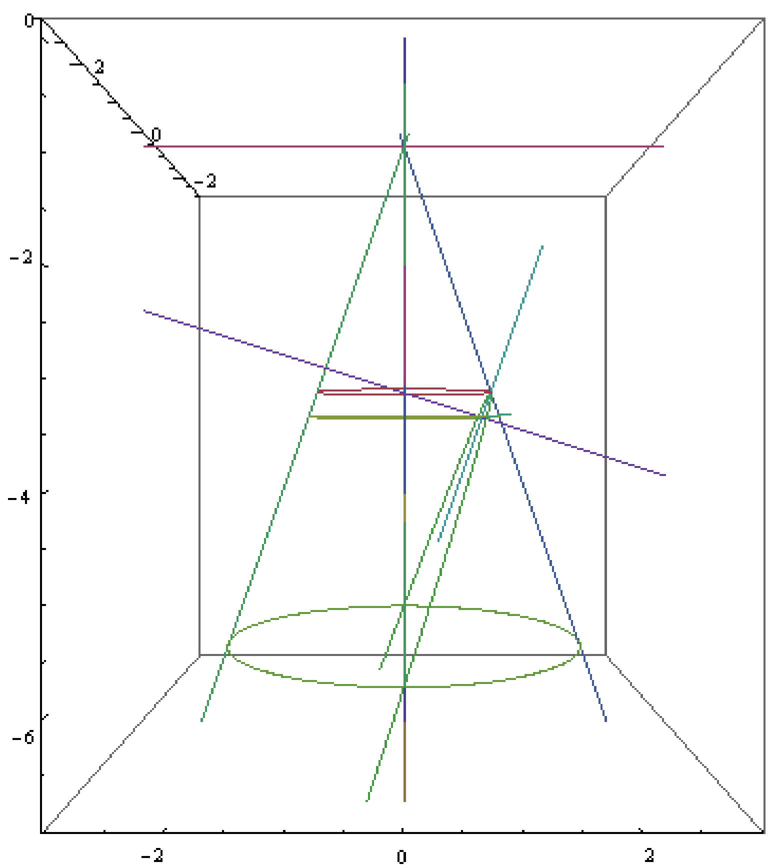
Sand Box Geometry LLC, a company dedicated to utility of Ancient Greek Geometry in pursuing exploration and discovery of Central Force Field Curves.

Using computer parametric geometry code to construct the focus of an Apollonian parabola section within a right cone.



"It is remarkable that the directrix does not appear at all in Apollonius great treatise on conics. The focal properties of the central conics are given by Apollonius, but the foci are obtained in a different way, without any reference to the directrix; the focus of the parabola does not appear at all... Sir Thomas Heath: "A HISTORY OF GREEK MATHEMATICS" page 119, book II.

The computer is my sandbox, the unit circle my compass, and the focal radius of the unit parabola my straight edge.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC

CAGE FREE THINKIN' FROM THE SAND BOX

The square space hypotenuse of Pythagoras is the secant connecting (π/2) spin radius (0, 1) with accretion point (2, 0). I will use the curved space hypotenuse, also connecting spin radius (π/2) with accretion point (2, 0), to analyze g-field energy curves when we explore changing acceleration phenomena of Gravity.

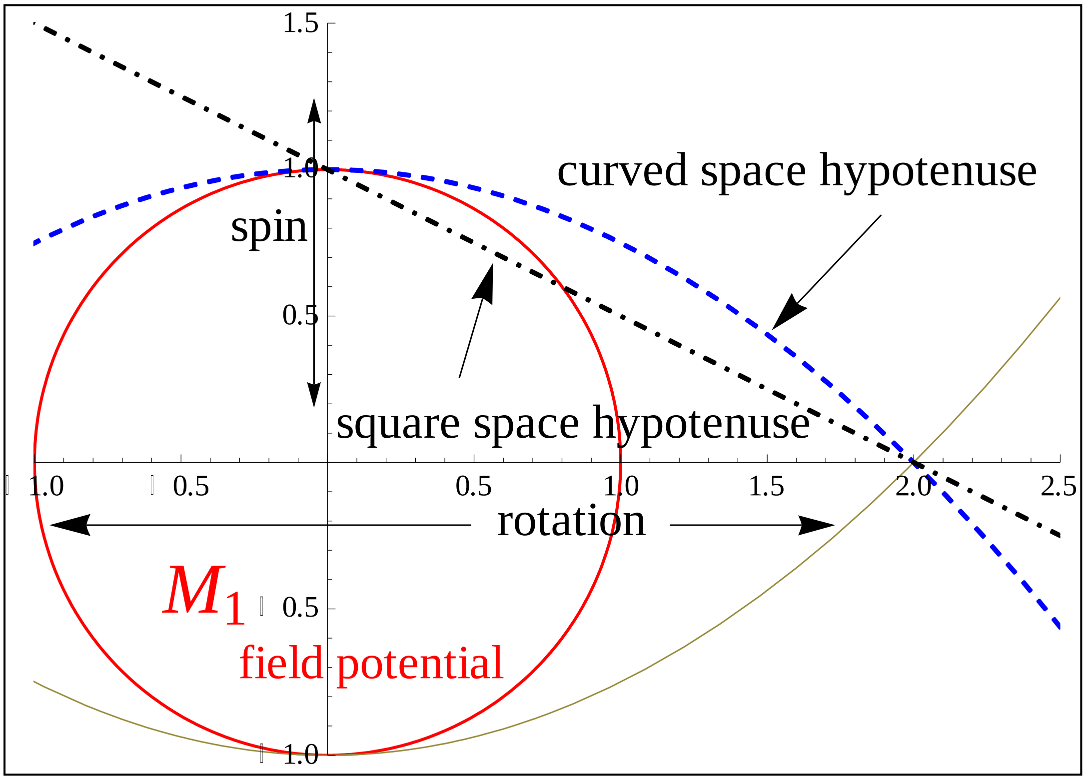


Figure 12: CSDA demonstration of a curved space hypotenuse and a square space hypotenuse together.

We have two curved space hypotenuses because the gravity field is a symmetrical central force and will have an energy curve at the **N** pole and one at the **S** pole of spin: just as a bar magnet. When exploring changing acceleration energy curves of M_2 orbits, we will use the N curve as our planet group approaches high energy perihelion on the north time/energy curve.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC