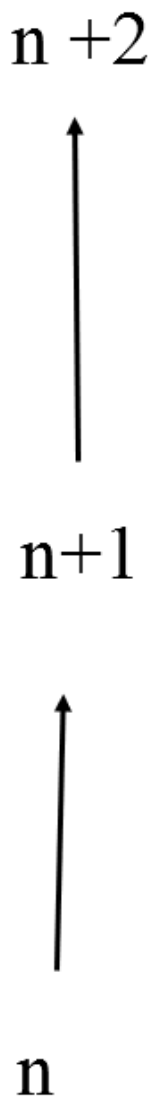
Succession of LaRouche-Riemann Manifolds

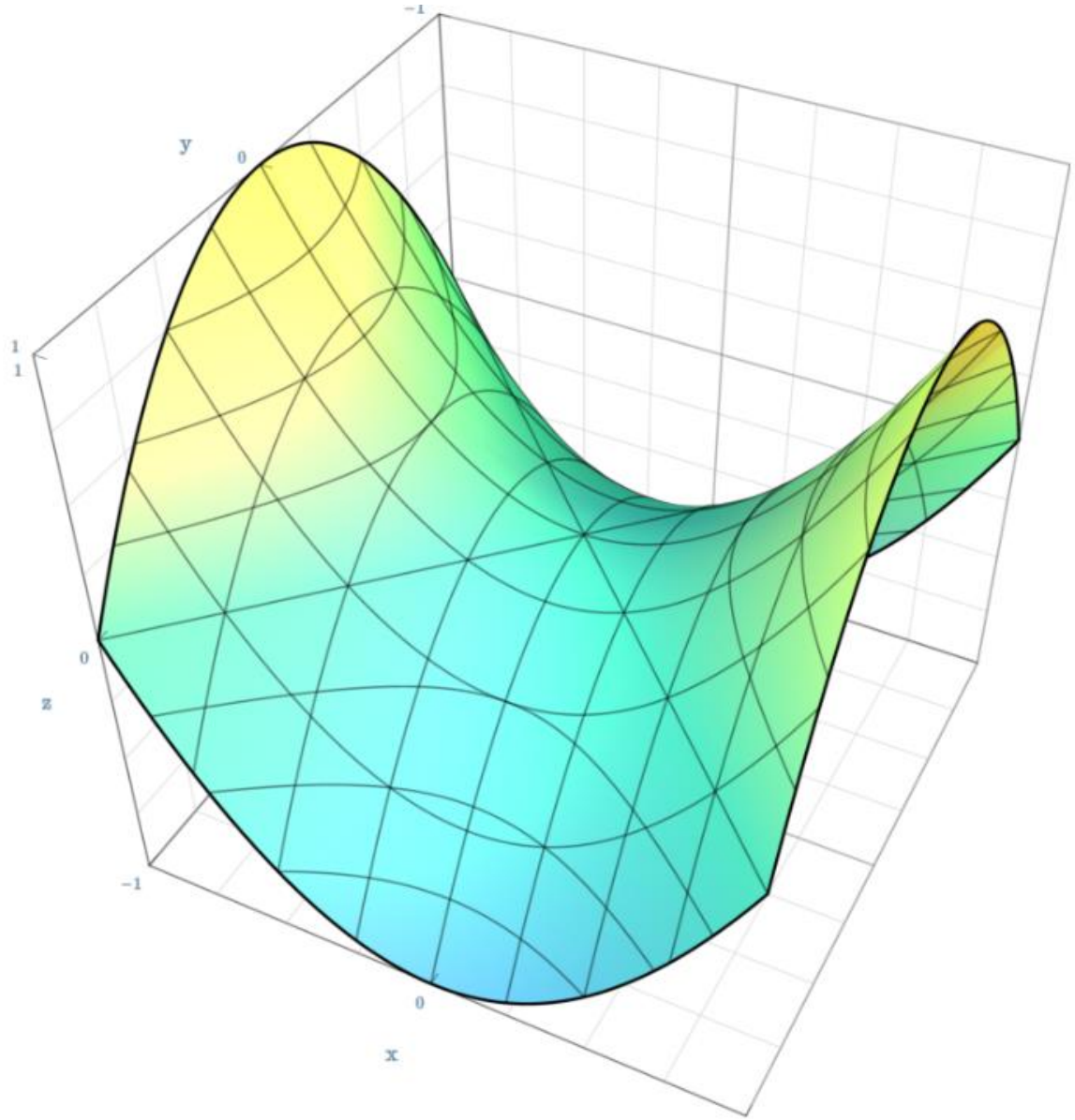


Gottfried Leibniz (1646-1716)

Portrait by Christian Albrecht Jensen

Carl Friedrich Gauss (1777-1855)

Bernhard Riemann (1826-1866)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z
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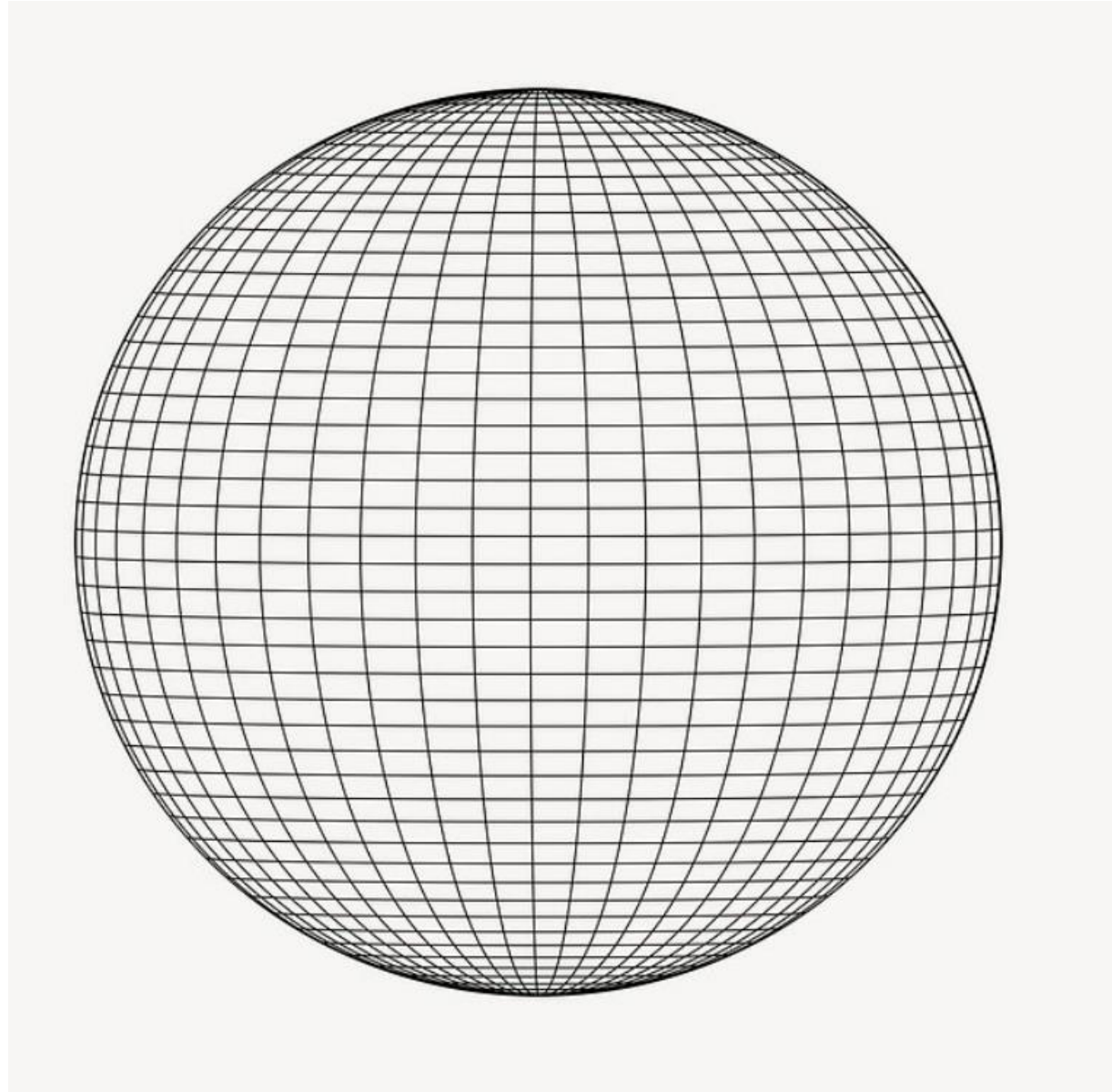
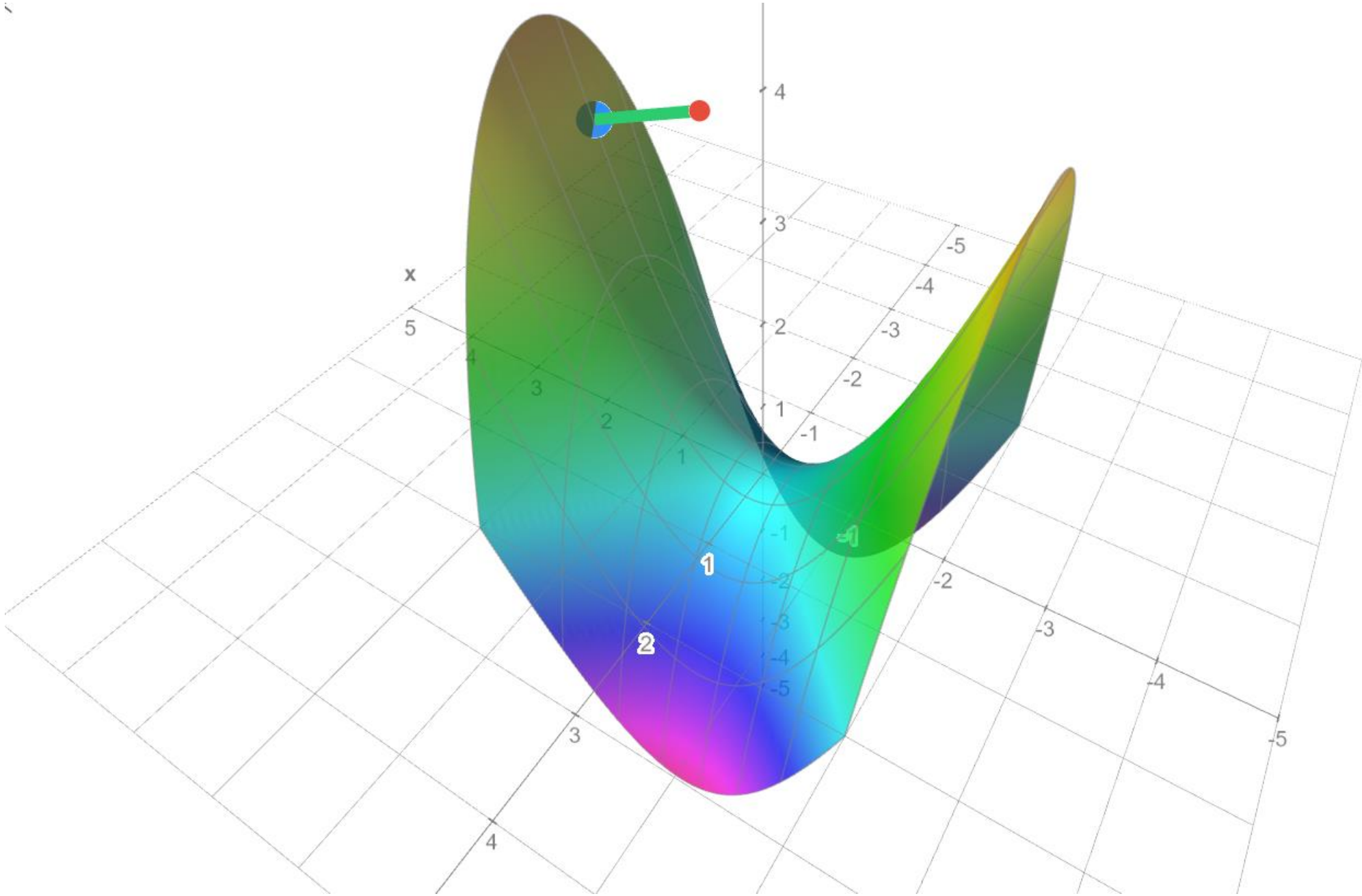
−1
0
x




x
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4
3
2
1
4
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1
-1
-2
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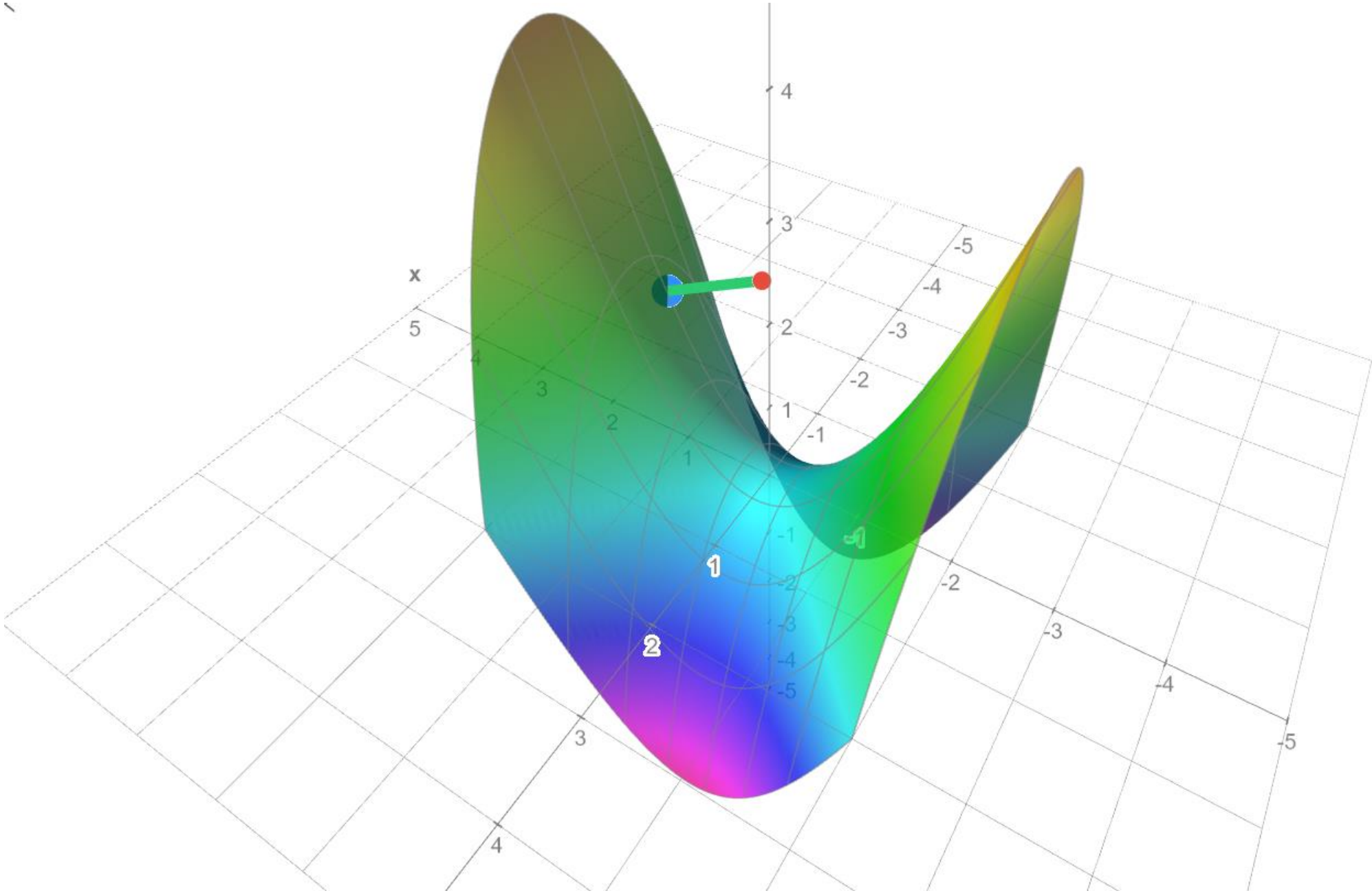
-5
-5
-4
-3
-2
-1
1
2


x
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2
1
4
3
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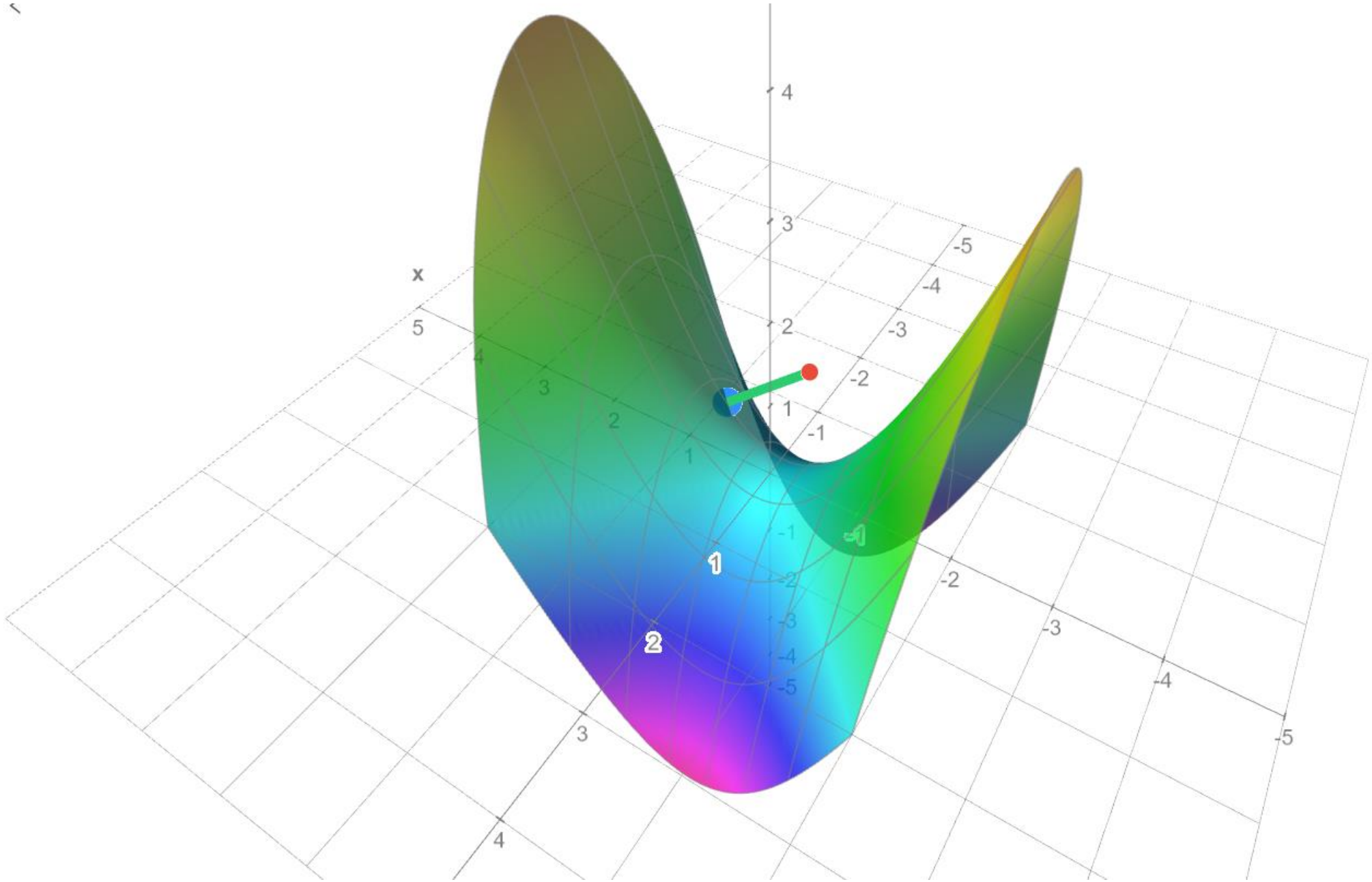
2
3
4


x
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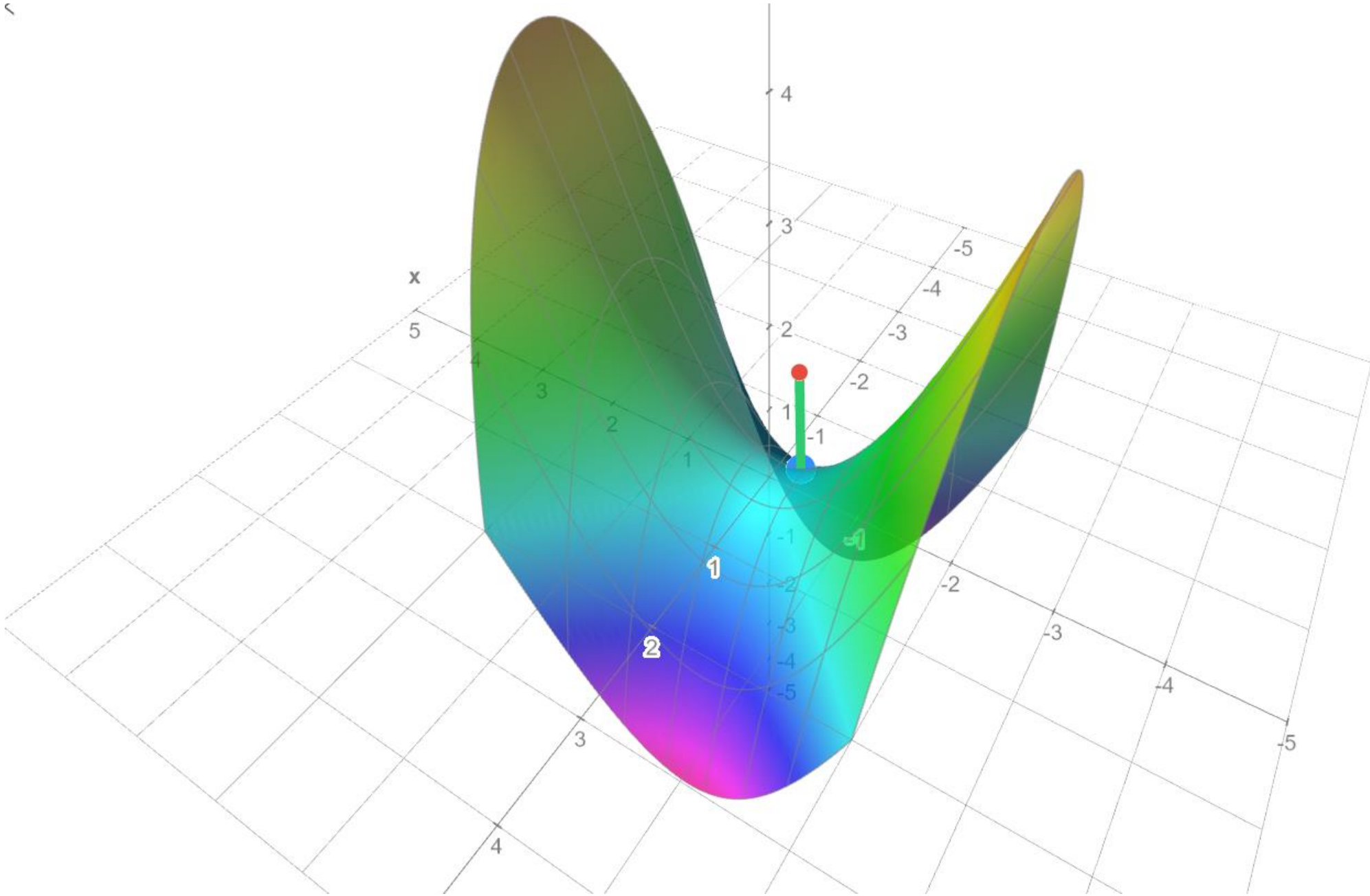
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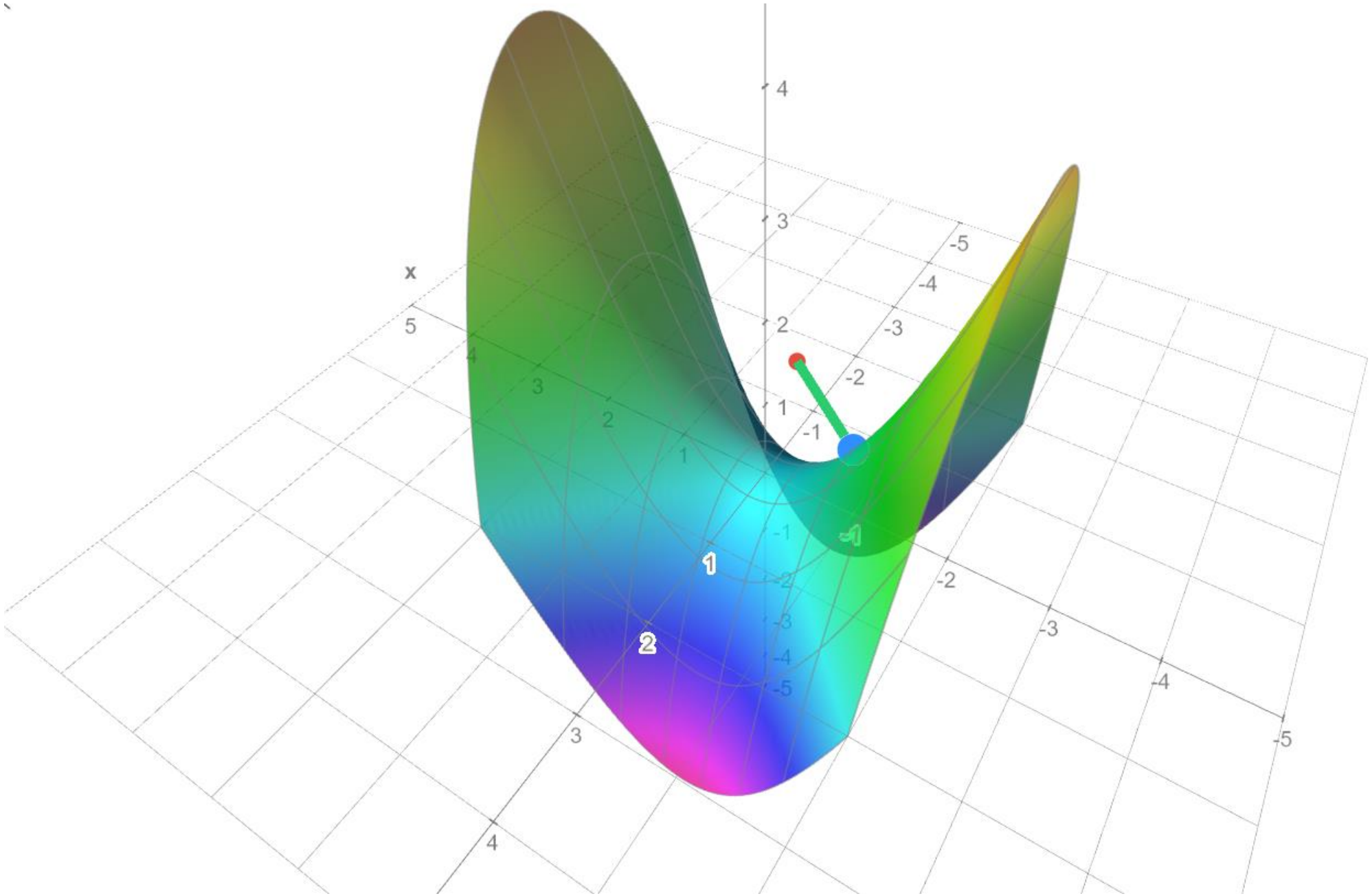
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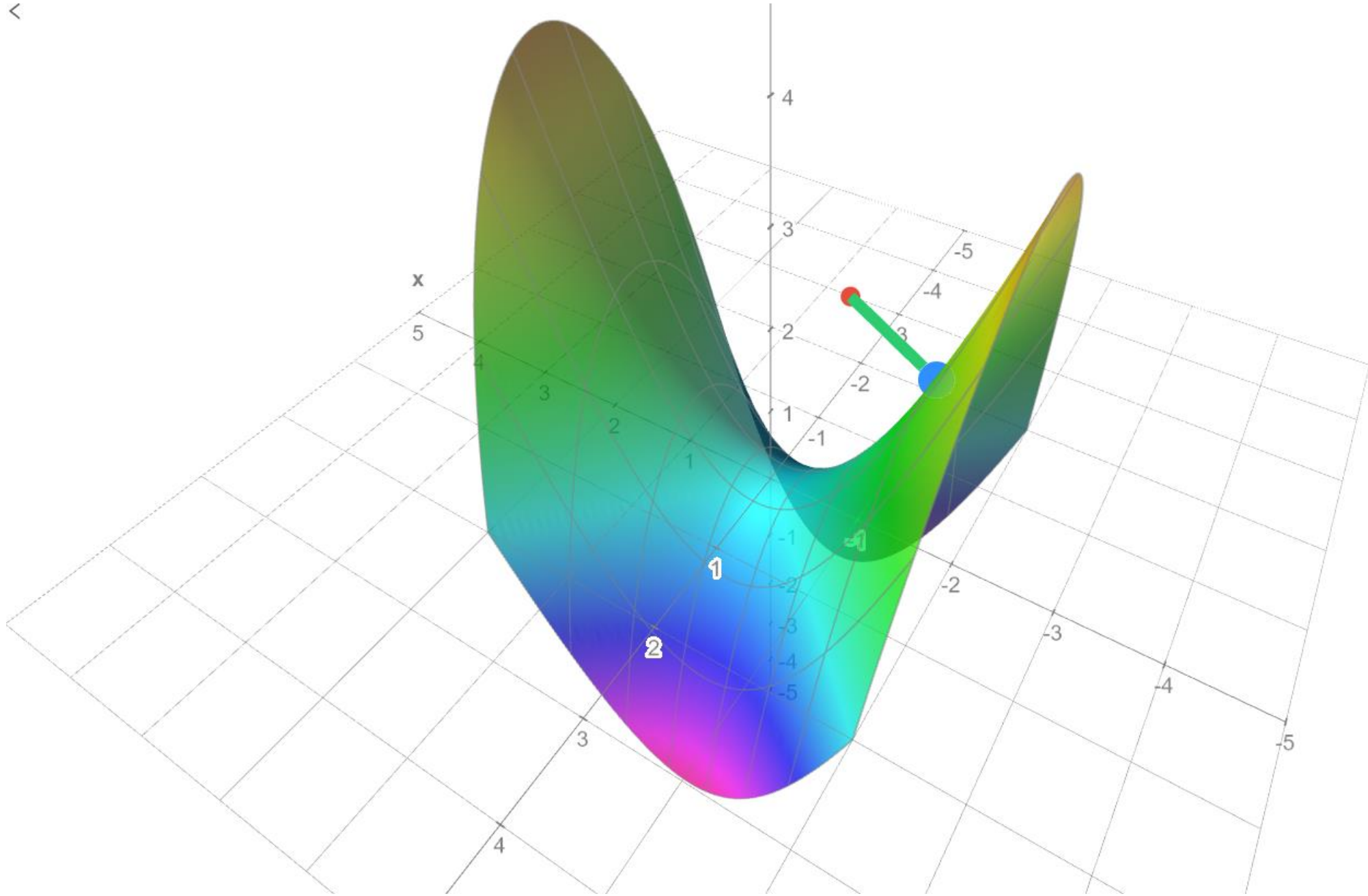
3
4


x
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2
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-1
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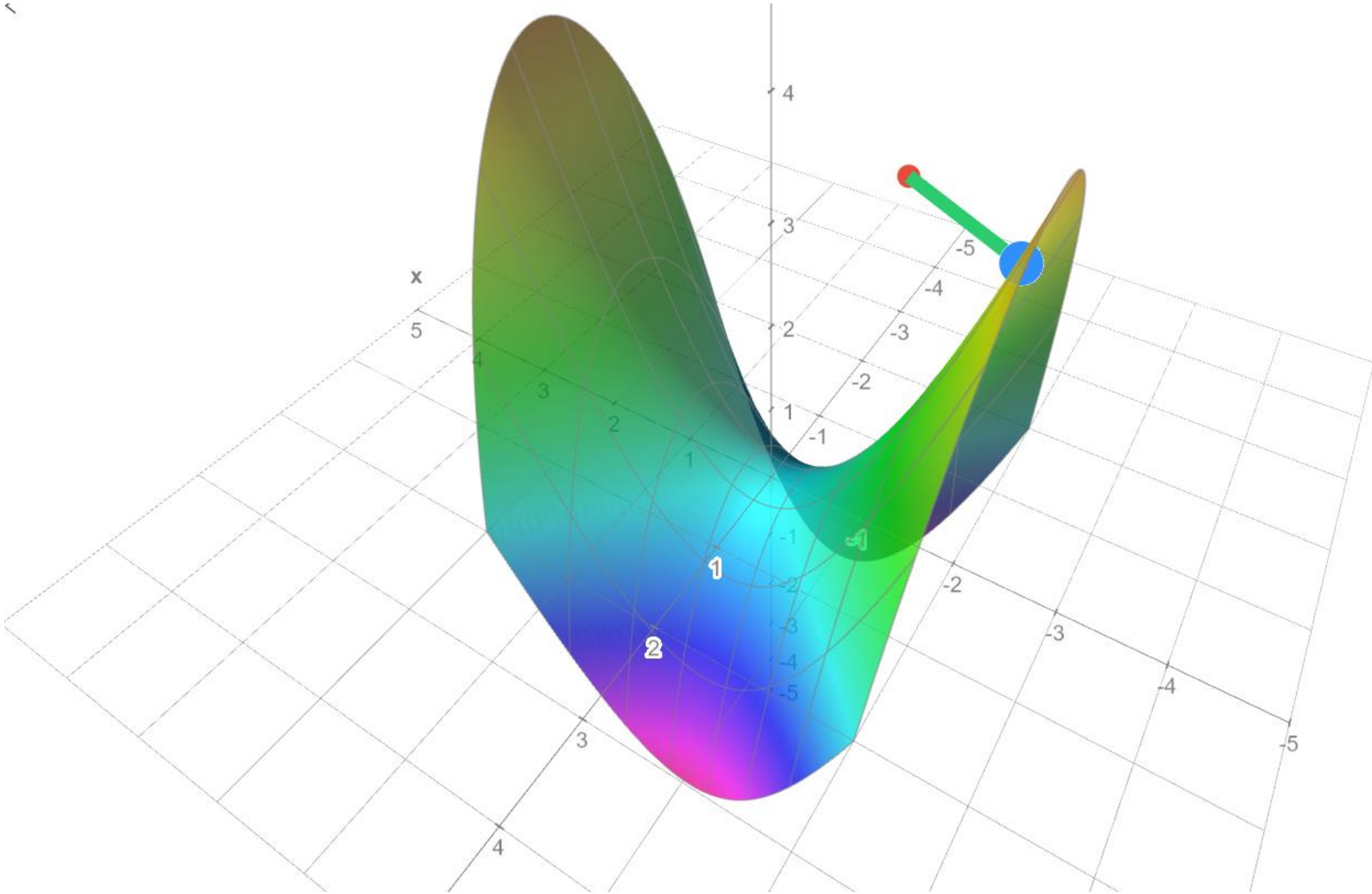
-3
-4
-5
1
2


x
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2
1
-1
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-3
-4
-5
-5
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-2
-1
1
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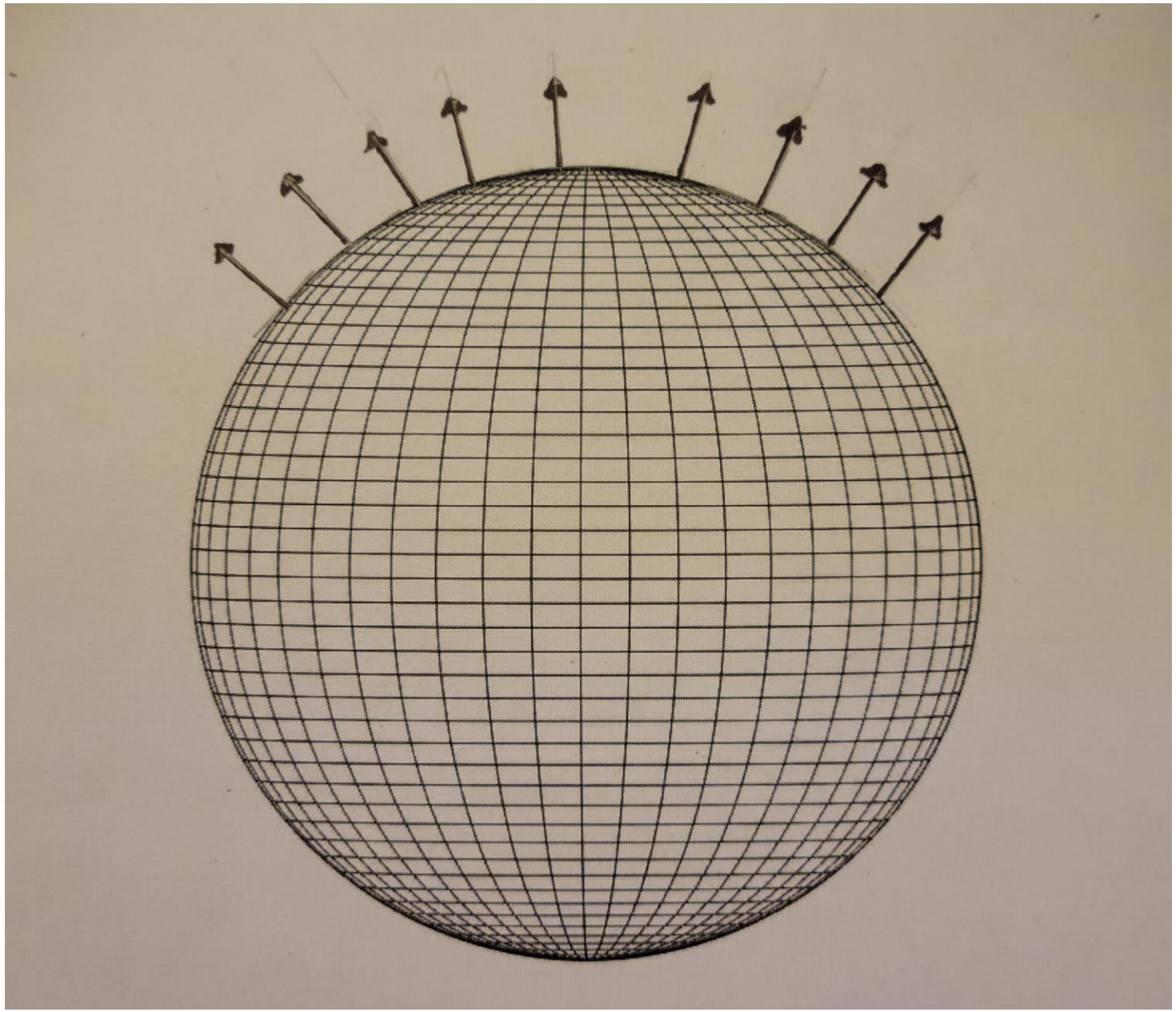
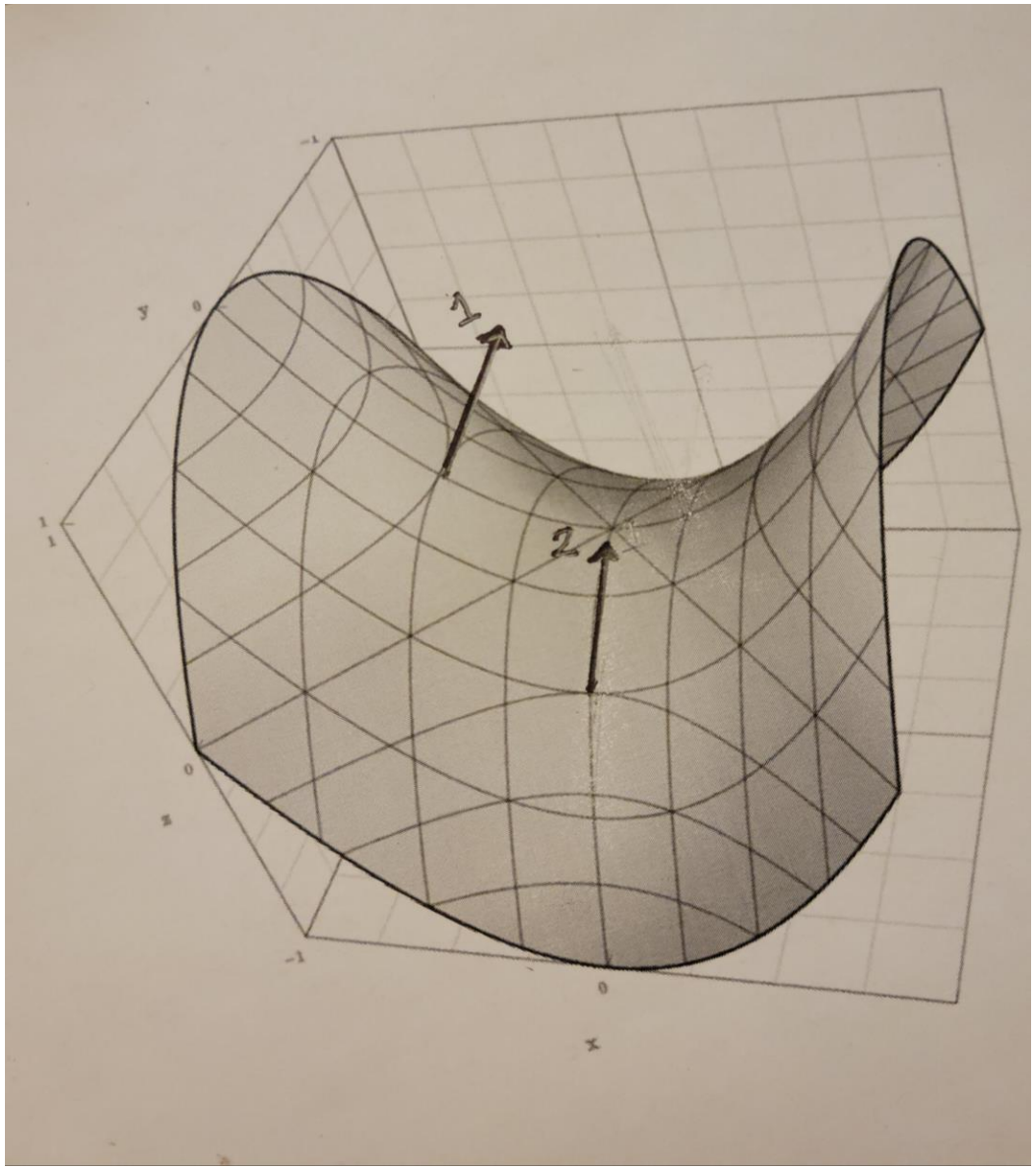
3
4

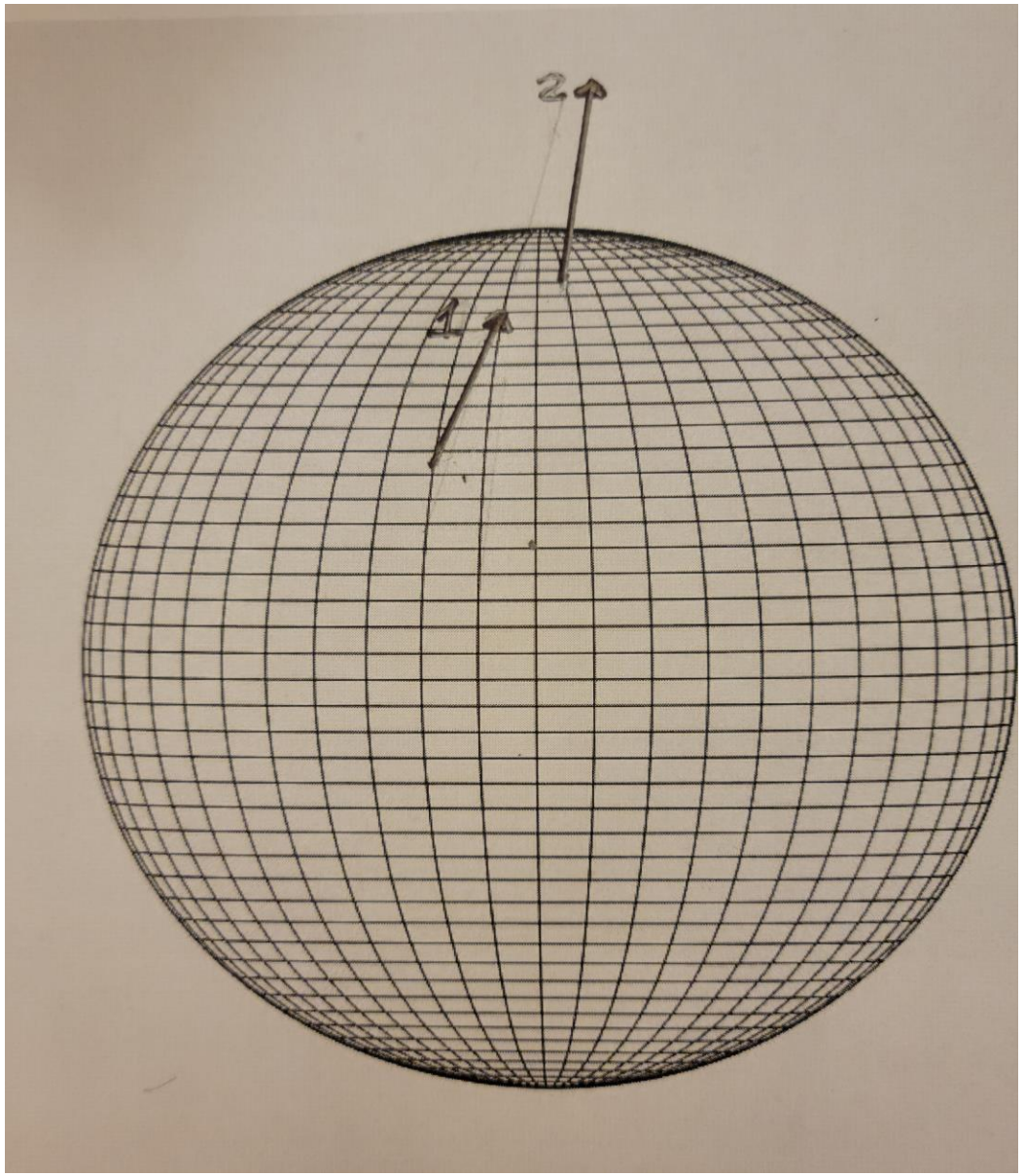
Sphere: Positive Curvature



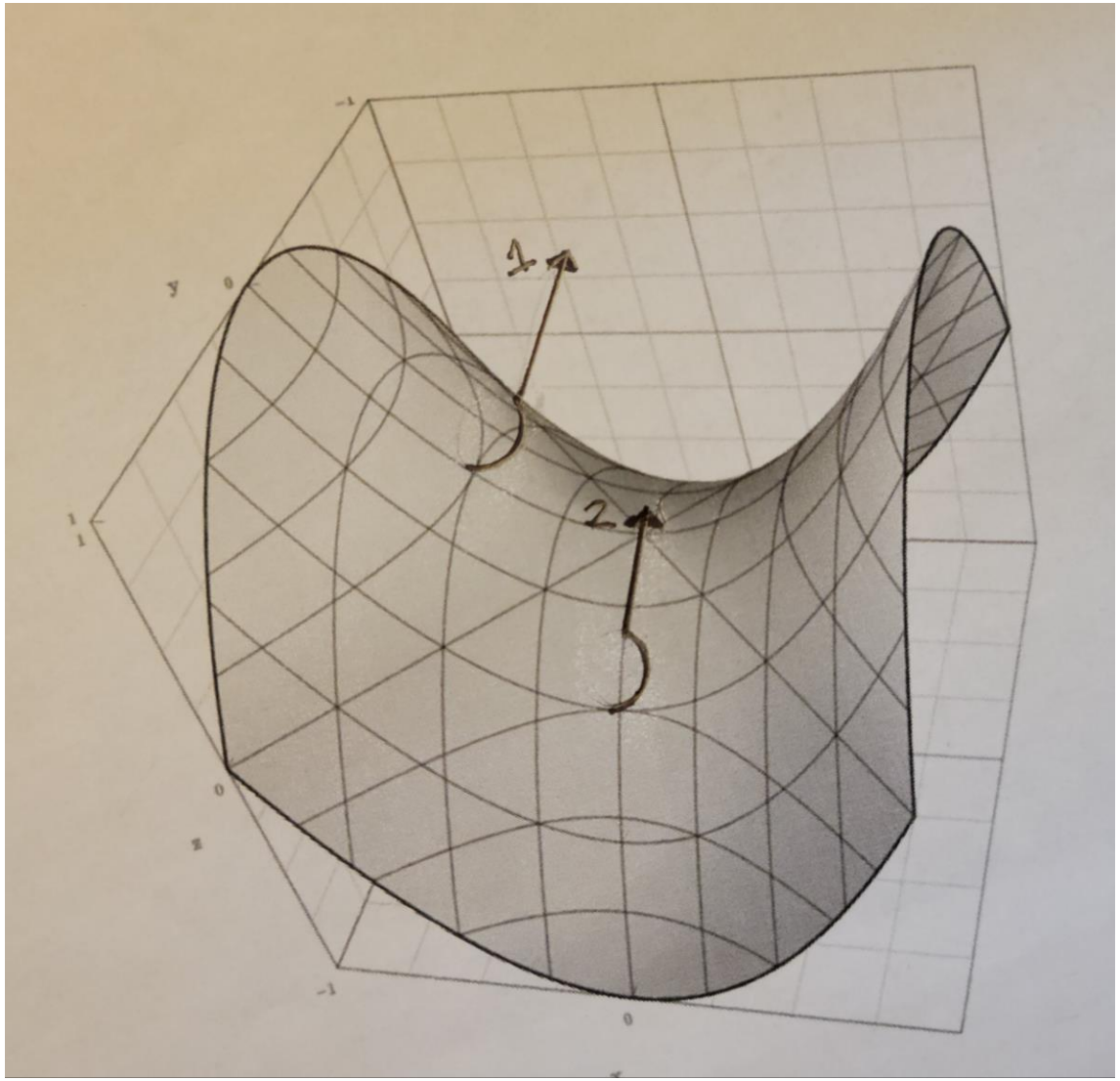
Primary Surface: Saddle



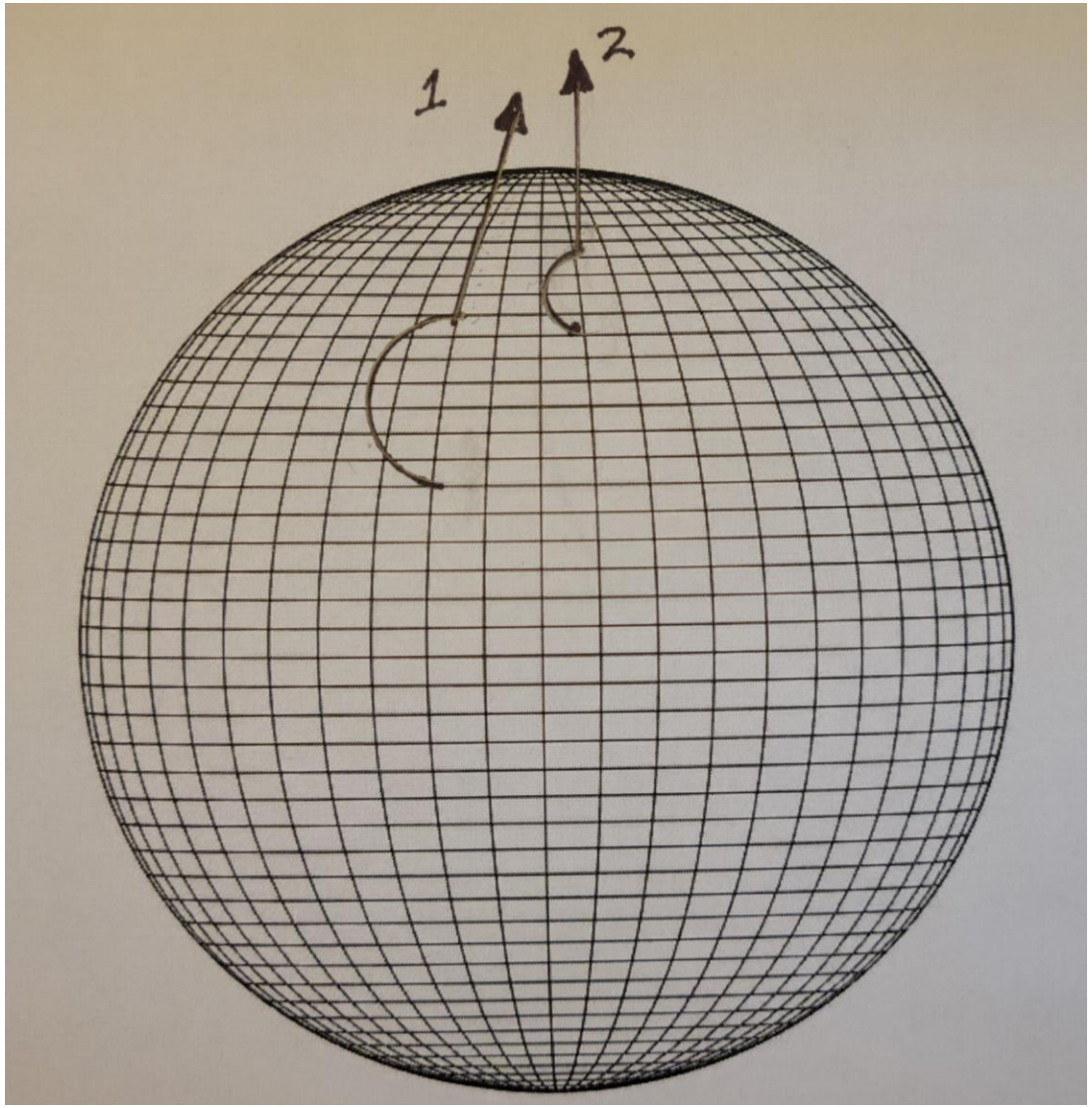
Auxiliary Sphere



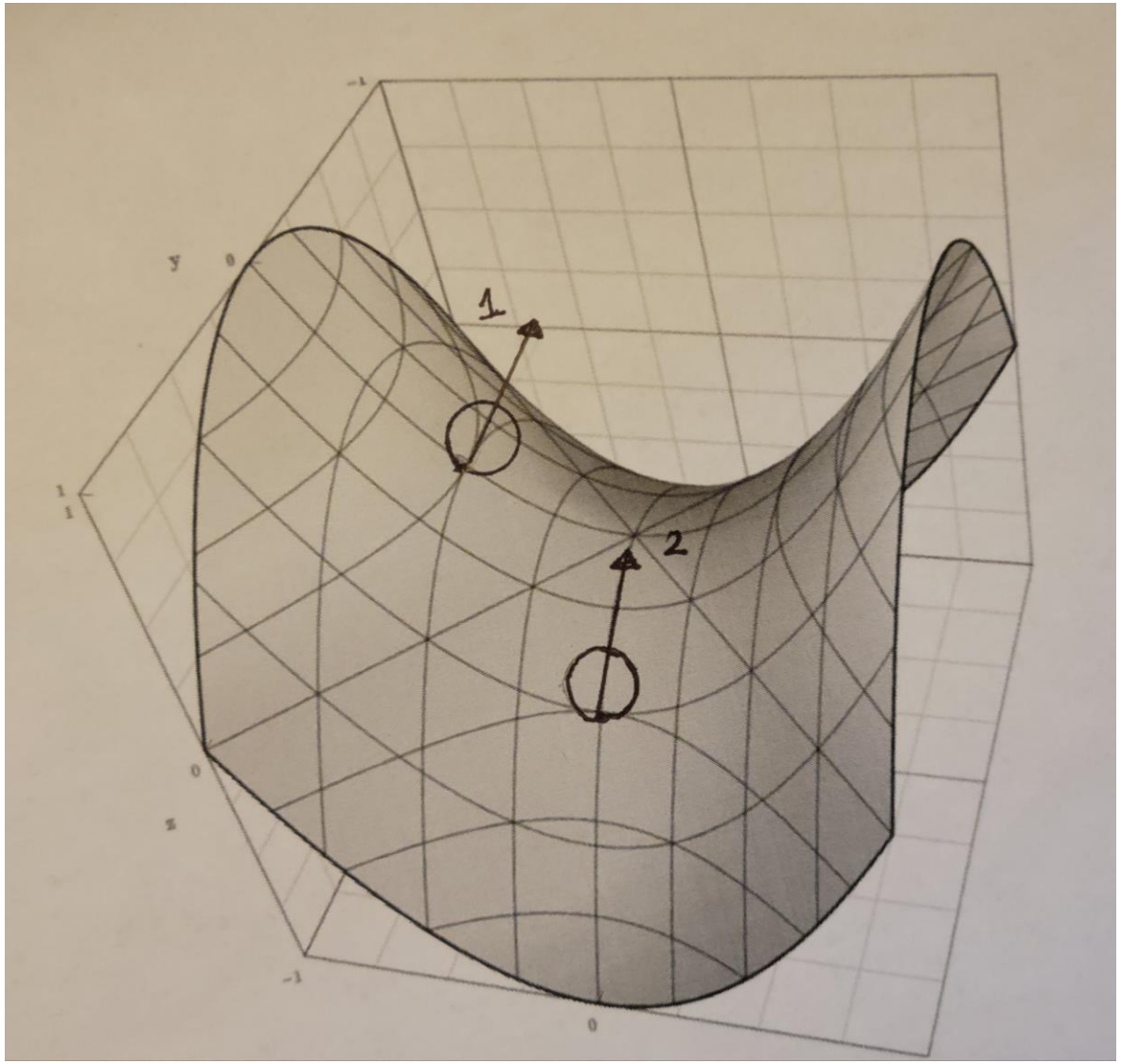
Primary Surface: Saddle



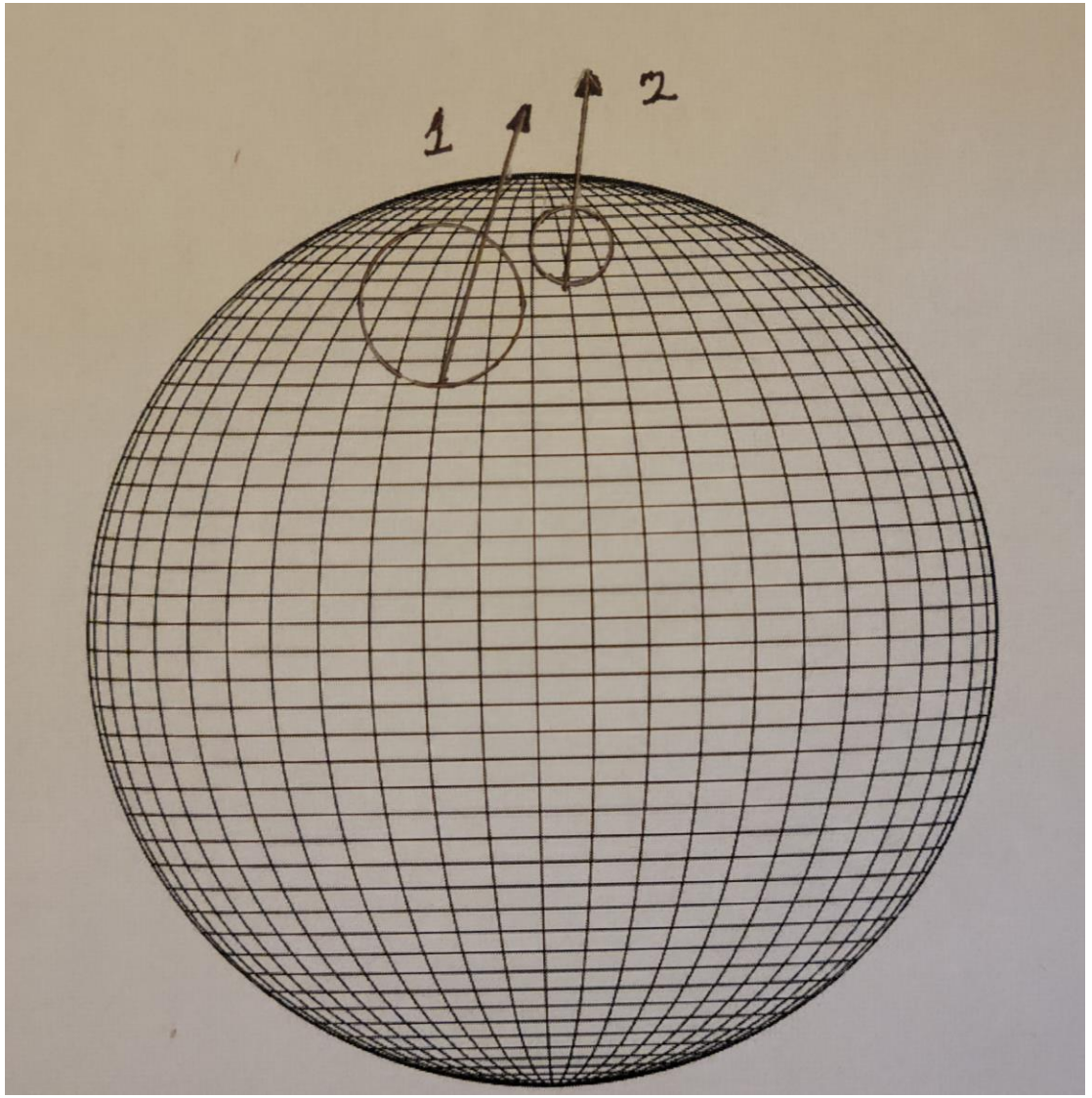
Auxiliary Sphere

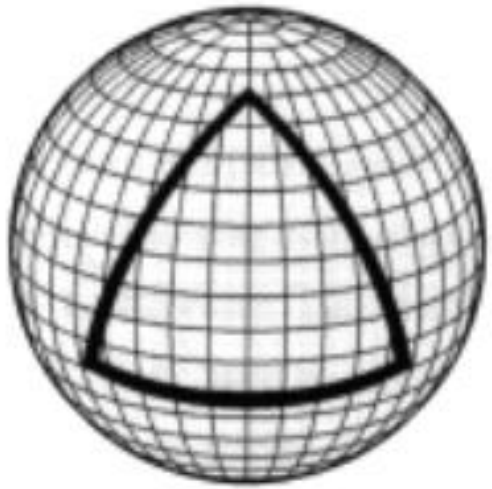


Primary Surface: Saddle

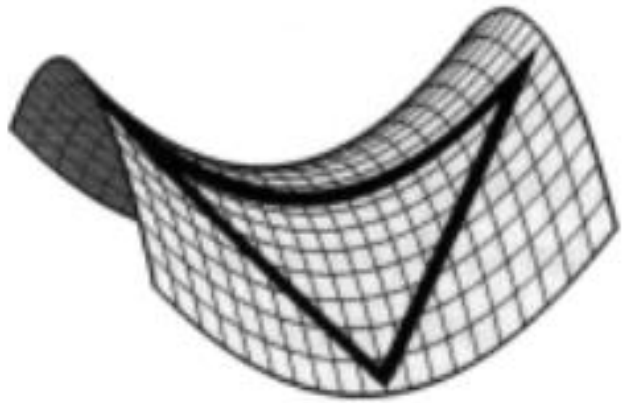


Auxiliary Sphere

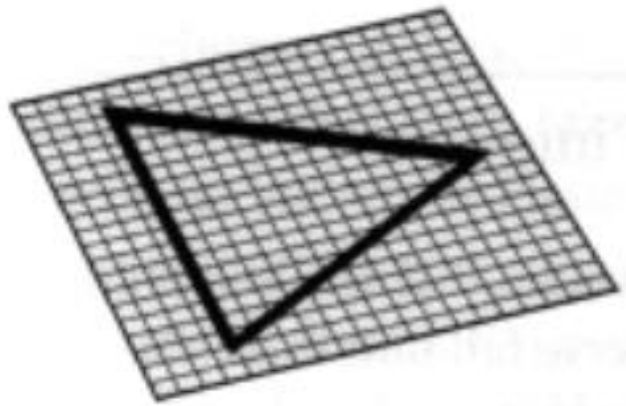




Positive Curvature



Negative Curvature



Flat Curvature

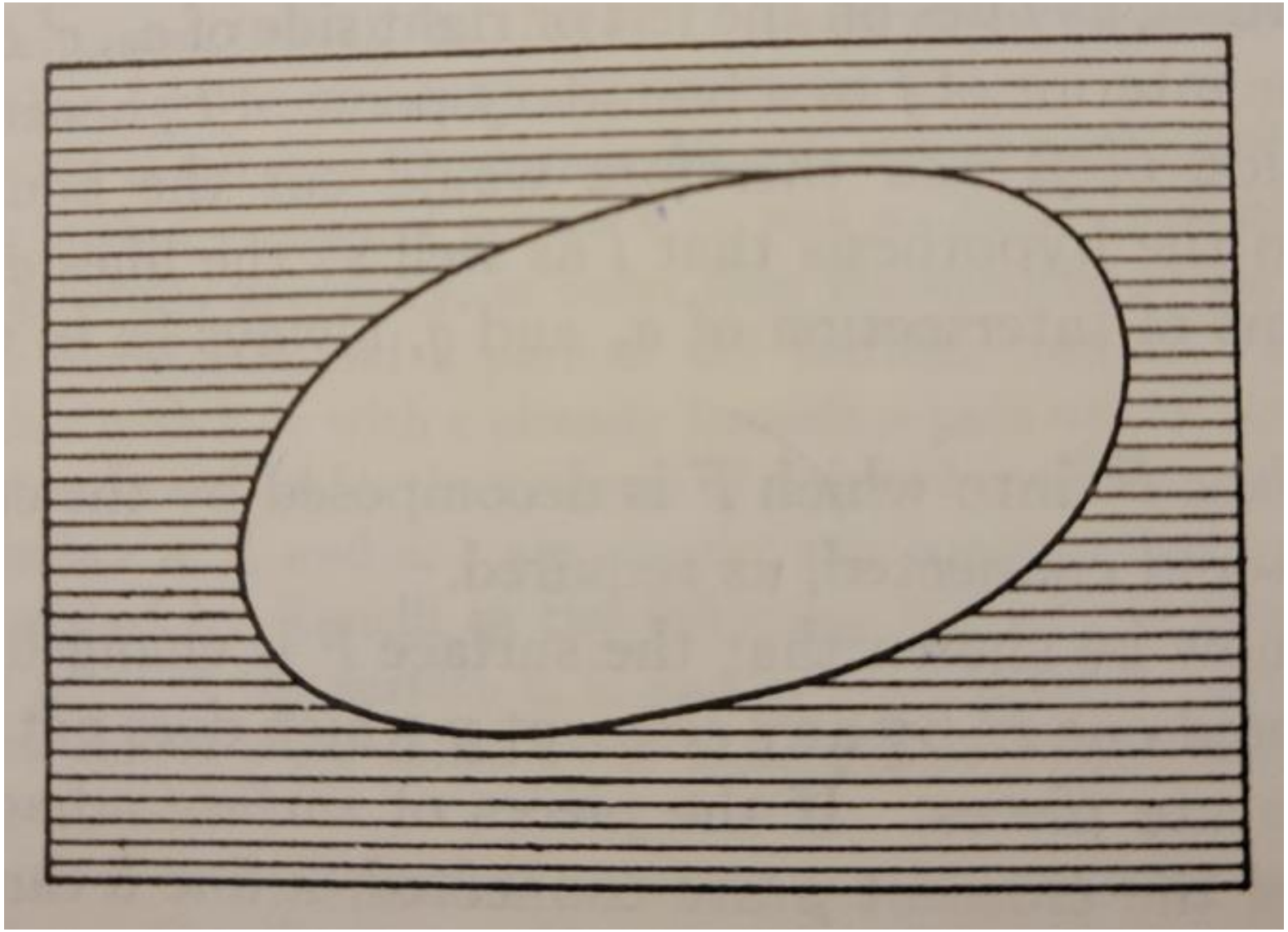
Source: Triangles on curved surfaces. Sum of interior angles of a triangle on the surface of a sphere is greater than 180°. Reprinted from: "Geometry of the Universe", J. Schombert, Univ. of Orgeon, extracted from https://medium.com/@madeofdarkmatter/how-do-astronomers-map-objects-in-the-sky-30501d58bbb4 article by Arya, Aayush.

"Remember our review of this matter in our study of Kepler's Snowflake paper?" Positive curvature is associated with non-living functions, such as the snowflake, which do exhibit entropy as an included characteristic. However, negative curvature requires a non-entropic ordering cohering with the limiting implications of the Golden Section."

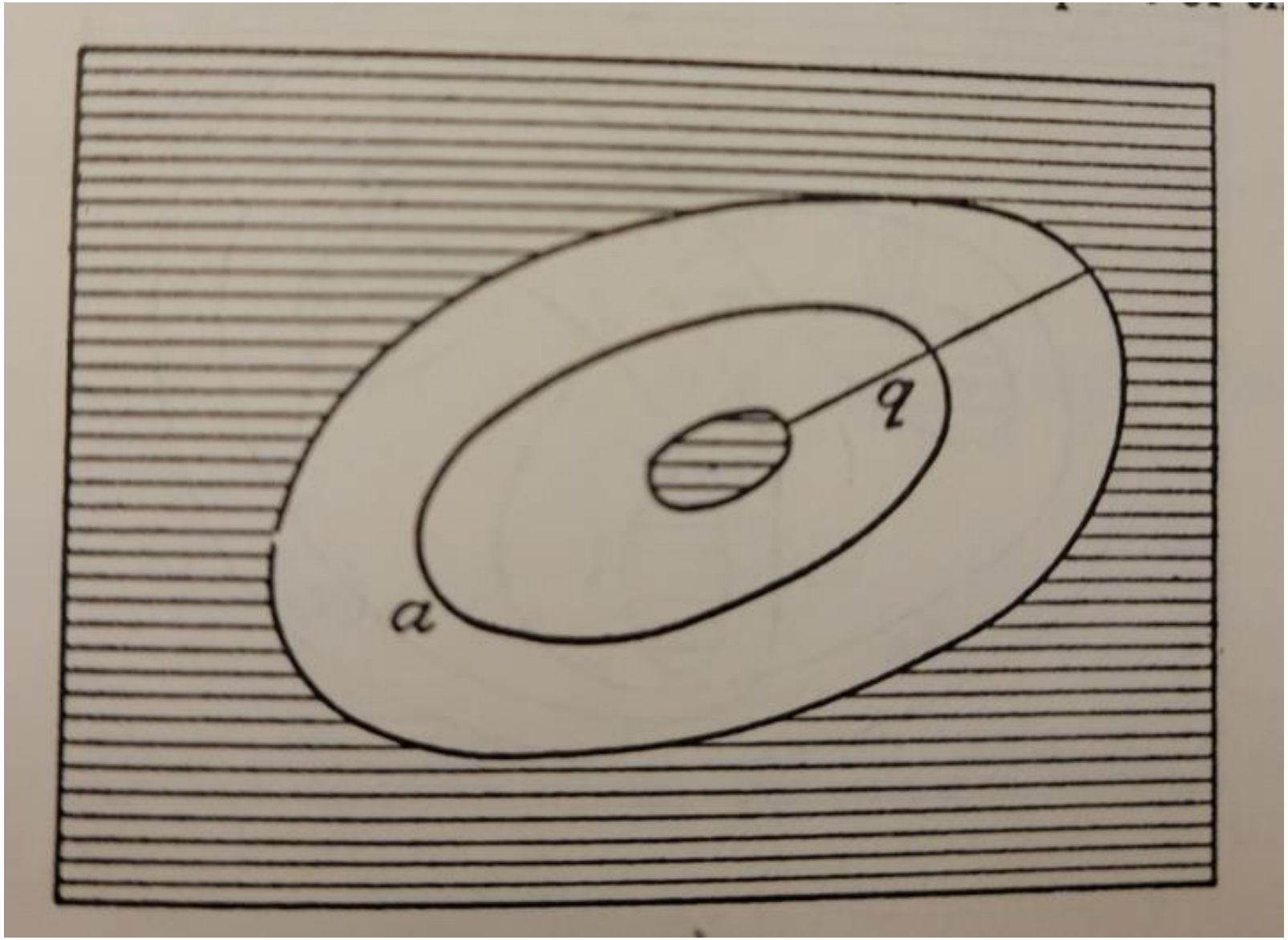
Lyndon LaRouche, "**On the Subject of Metaphor**,"

Fidelio magazine, Fall 1993

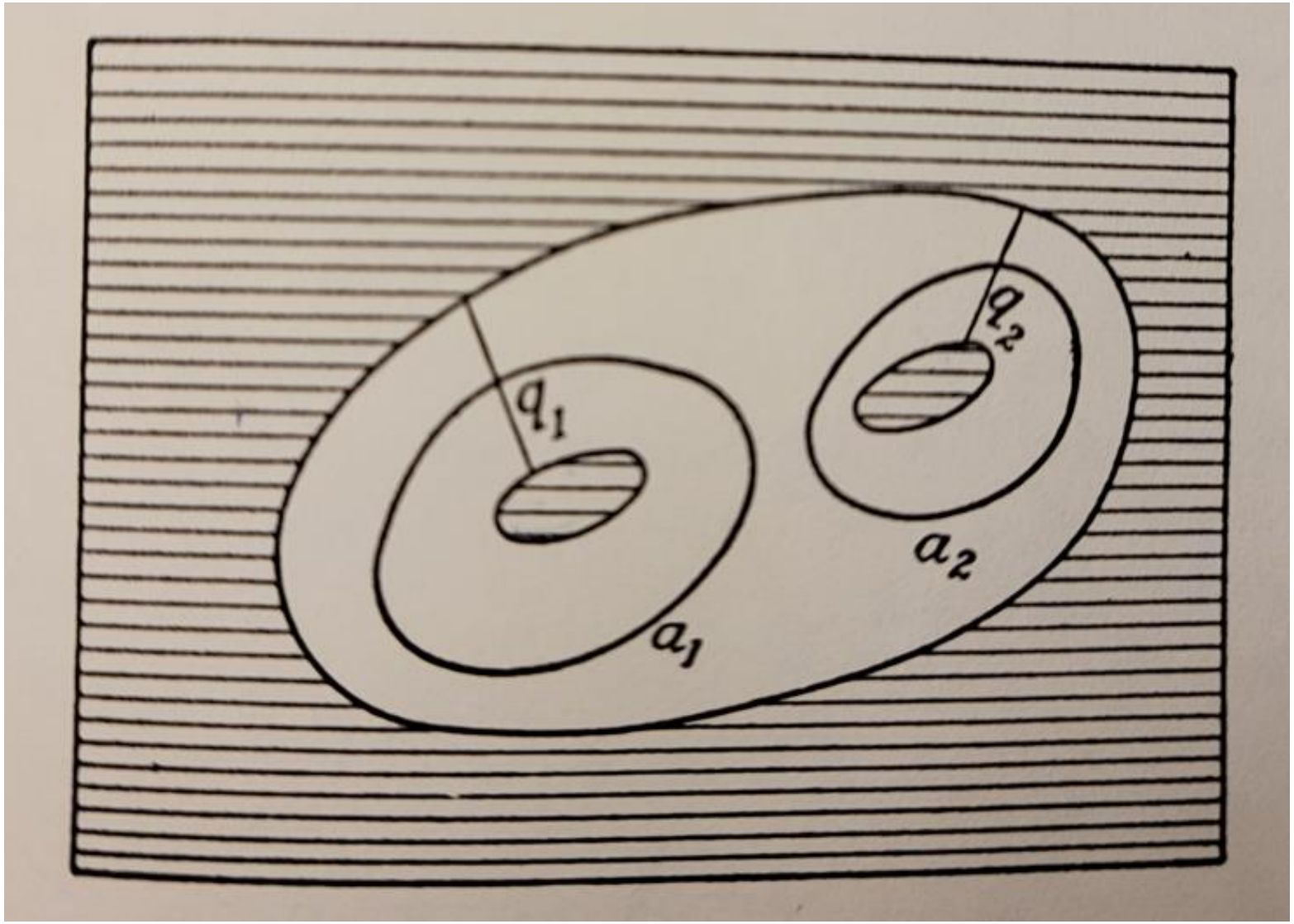
Simply Connected



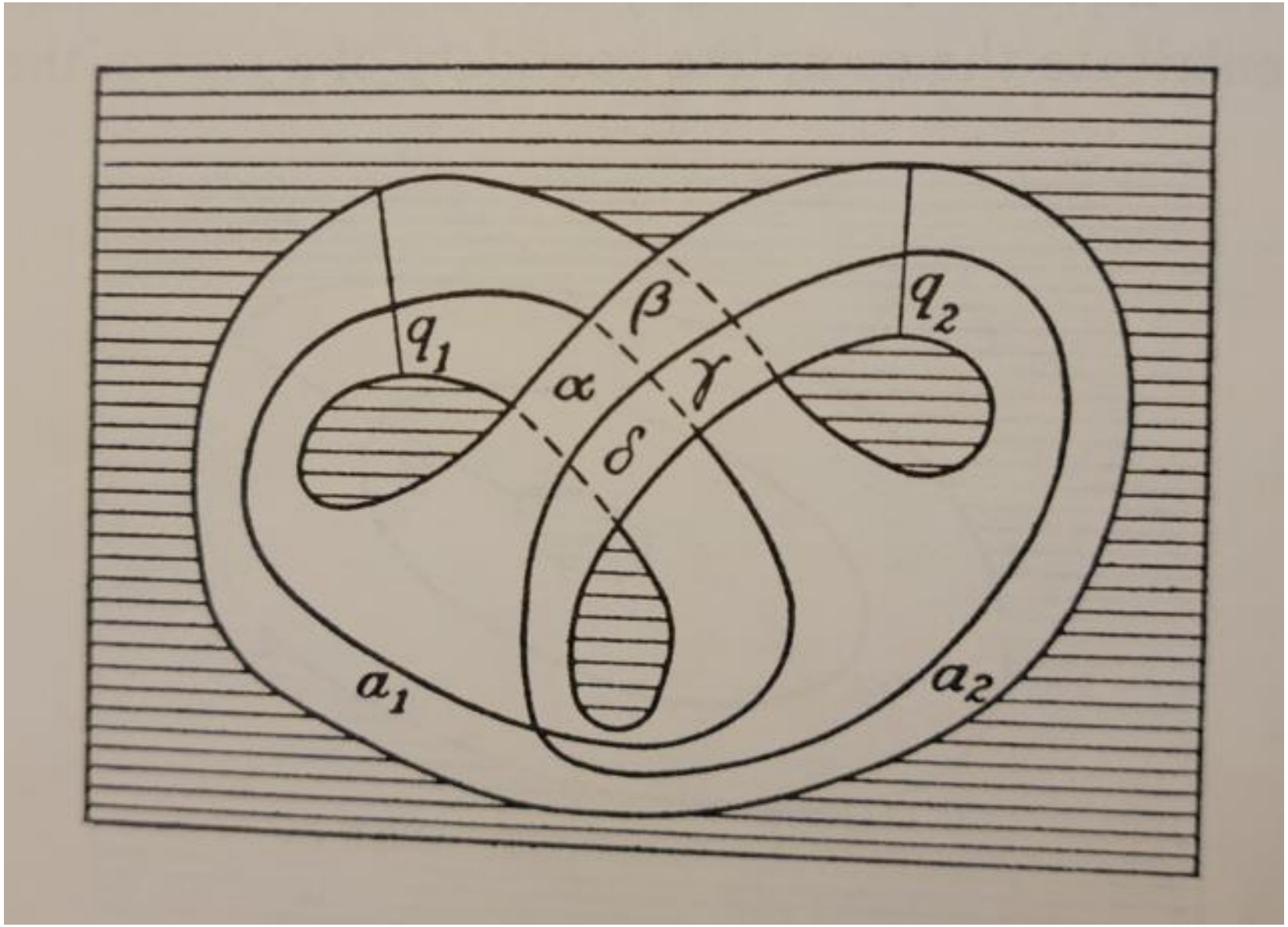
Doubly Connected

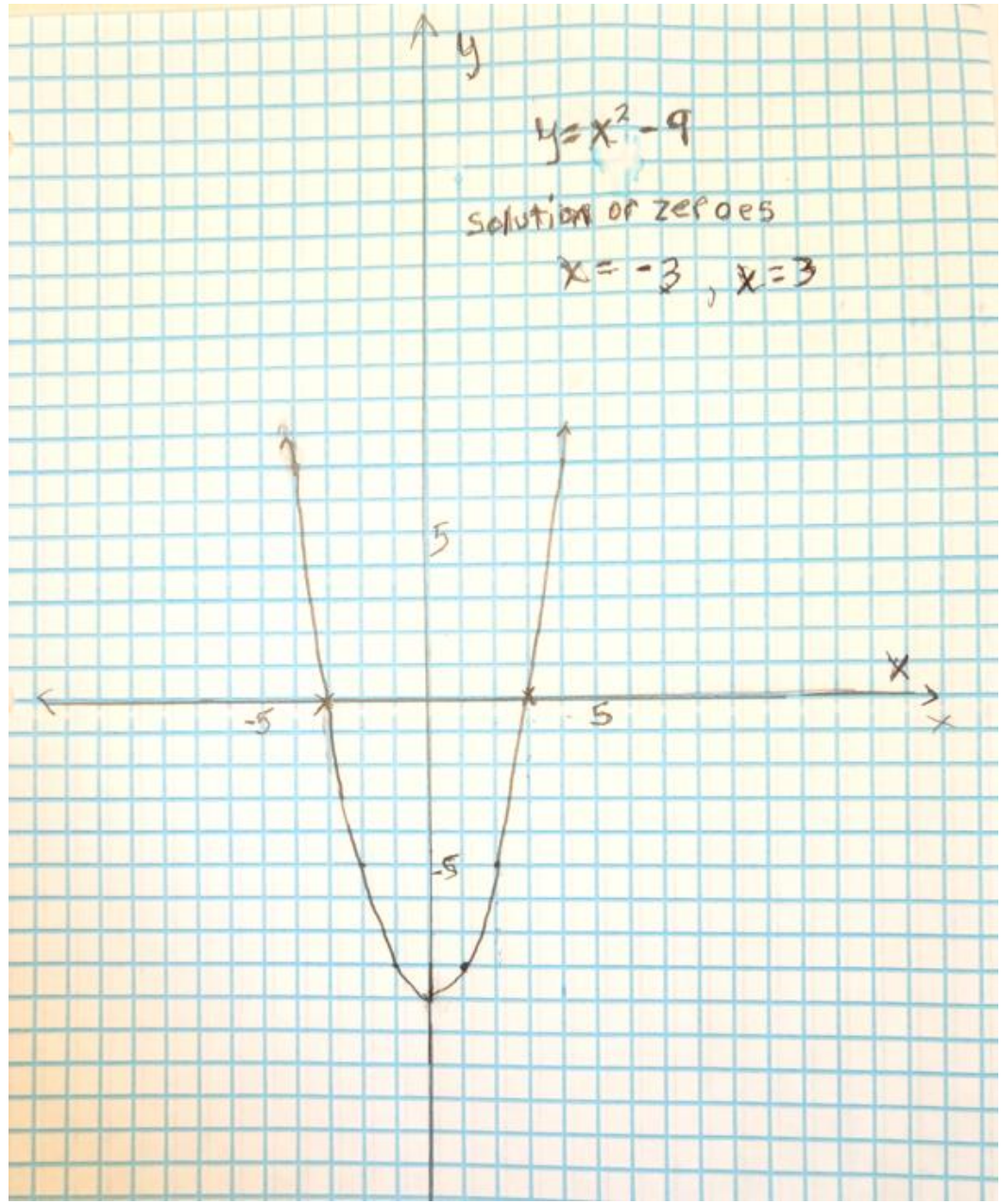


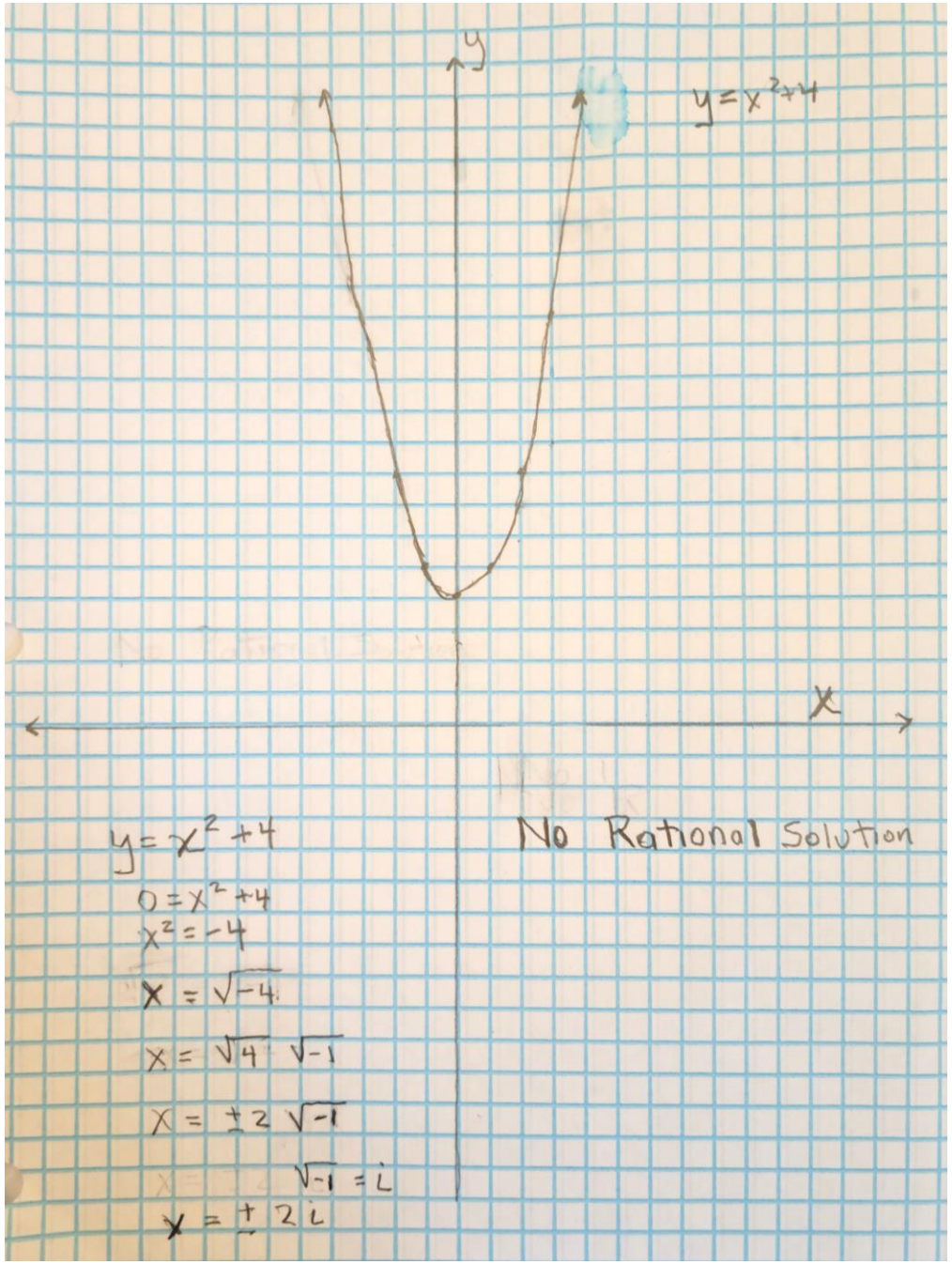
Triply Connected

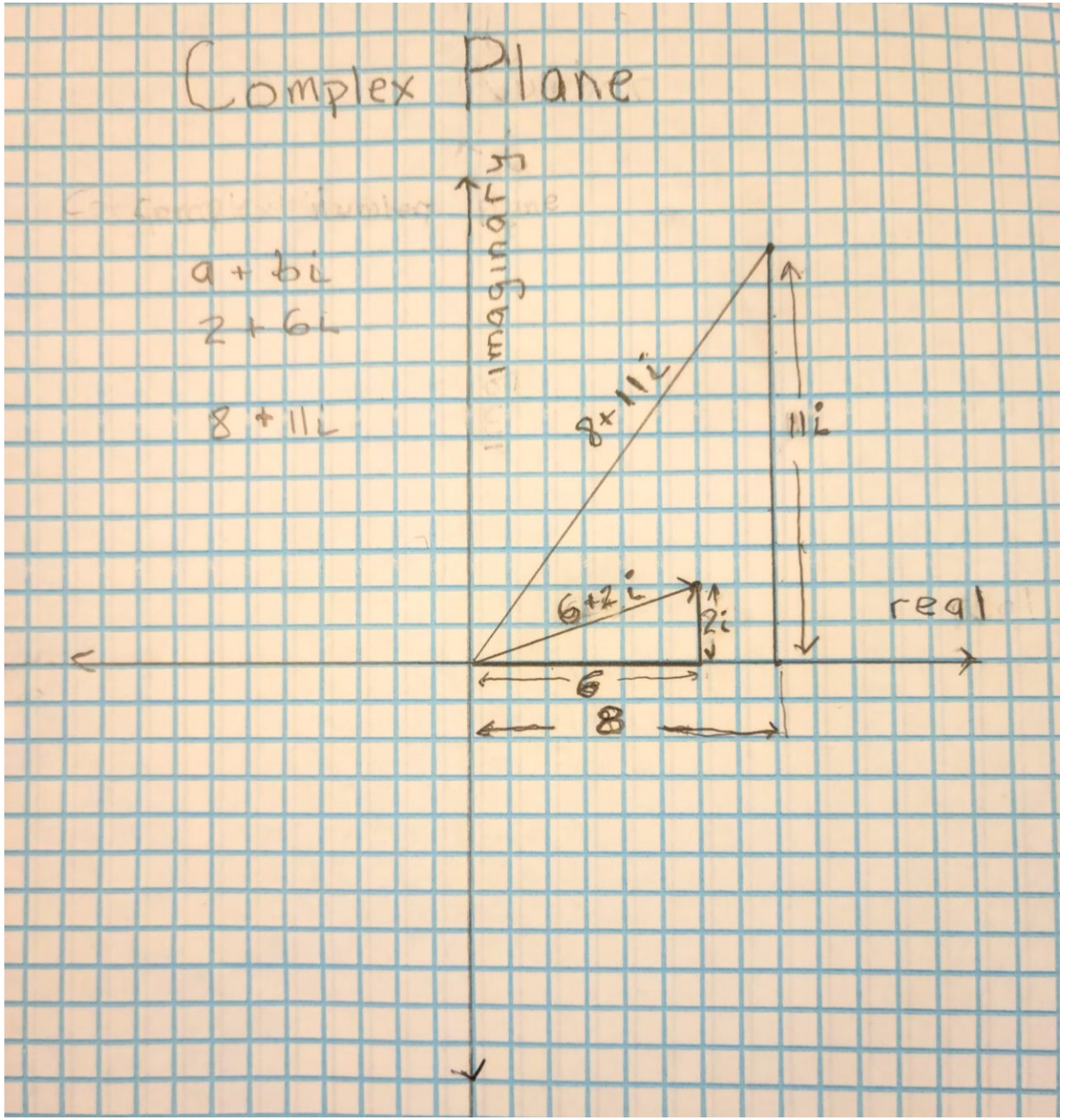


Connecting the Curve




y
$y = x^2 - 9$
solution or zeroes
$x = -3, x = 3$
5
-5
-5
5
x
x


y
x
$y = x^2 + 4$
$y = x^2 + 4$
No Rational Solution
$0 = x^2 + 4$
$x^2 = -4$
$x = \sqrt{-4}$
$x = \sqrt{4}\ \sqrt{-1}$
$x = \pm 2\sqrt{-1}$
$\sqrt{-1} = i$
$x = \pm 2i$


Complex Plane
a + bi
2 + 6i
8 + 11i
imaginary
real
8 + 11i
11i
6 + 2i
2i
6
8

Video:

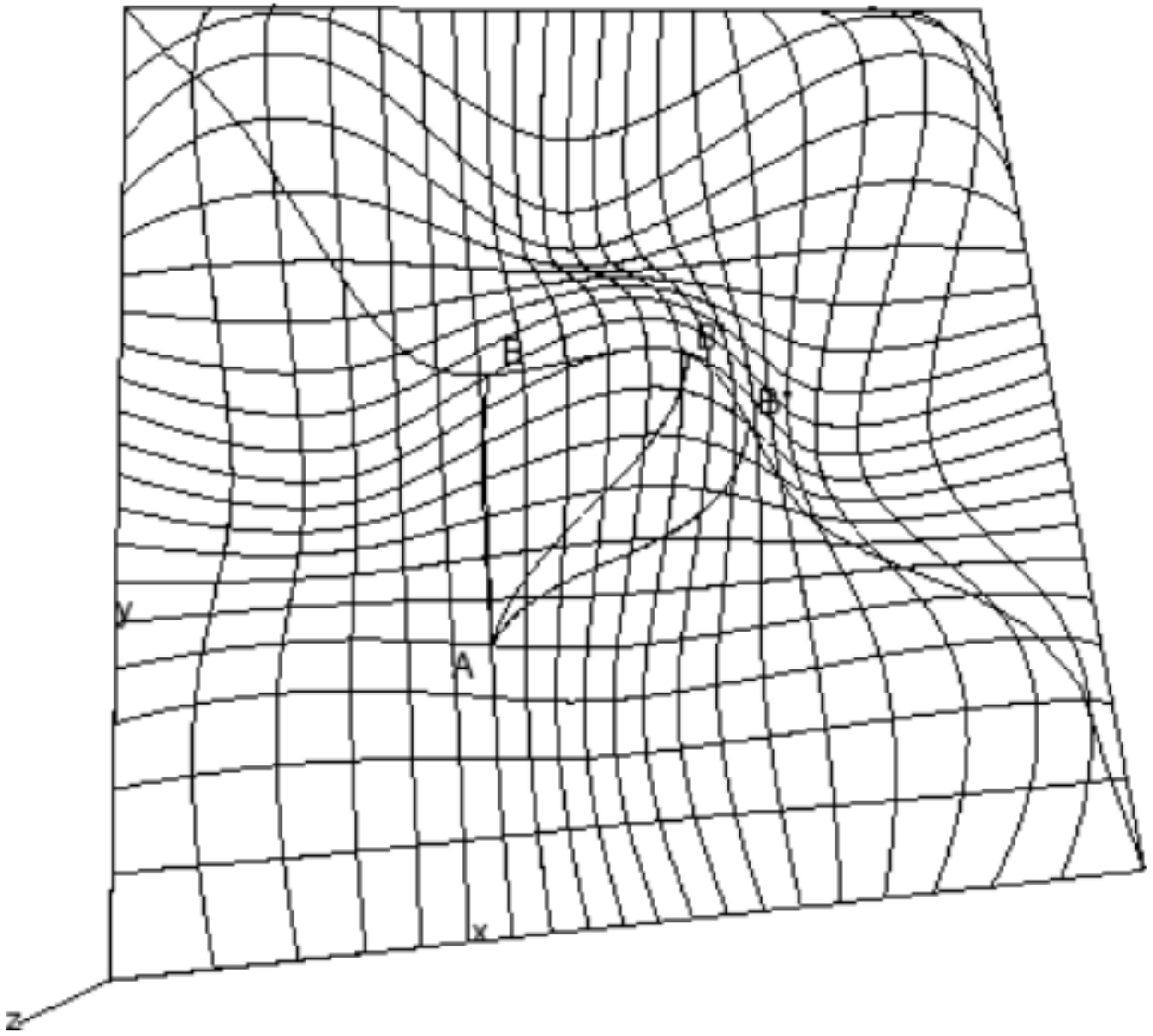
[Multiplying complex numbers as vectors]

Video:

Multiplying complex numbers: i×i=-1

Video:

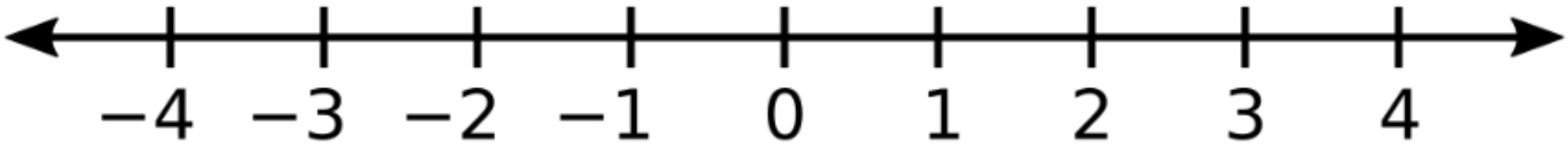
[Two layers of complex squaring]



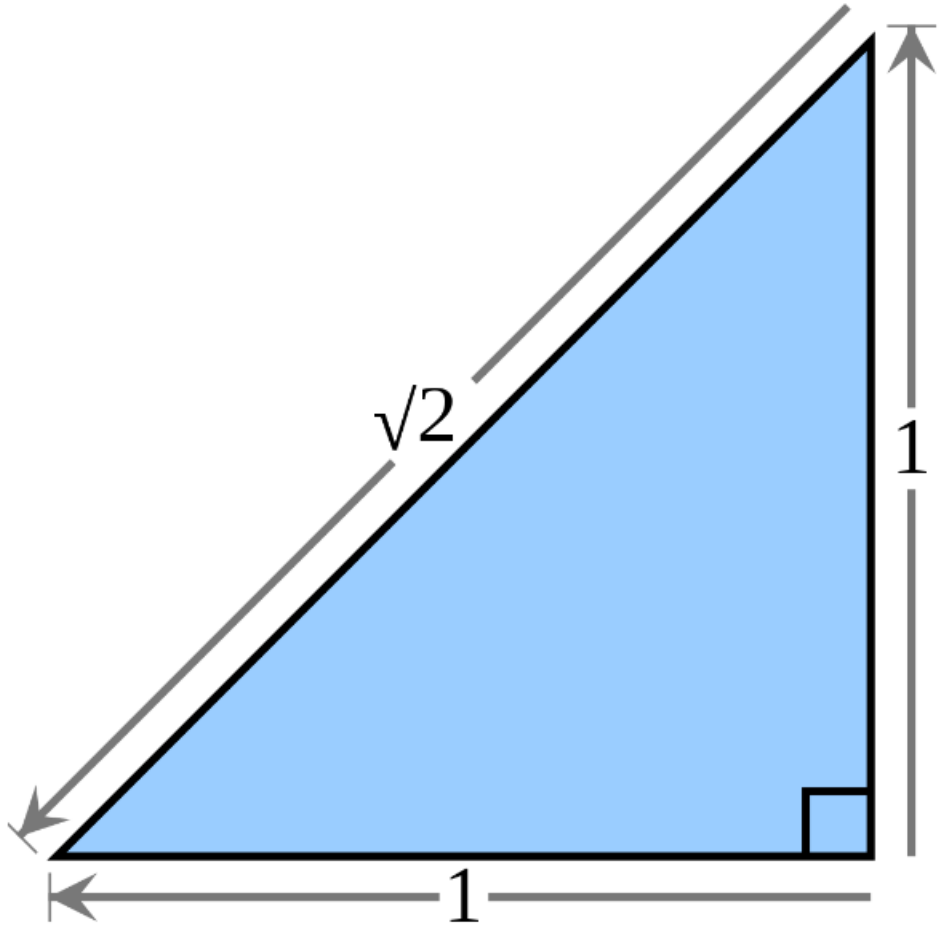
Source: 10.6.2 Geodesic Path between a Point and a Curve, web.mit.edu/hyperbook/Patrikalakis-Maekawa-Cho/node207.html. Accessed 3 Aug. 2023. Adapted from T. Maekawa Computation of Shortest Paths on free-form parametric surfaces, *Journal of Mechanical Design Transactions of the ASME*, 118(4):499-508, December 1996

Geodesic is Shortest Distance On Earth

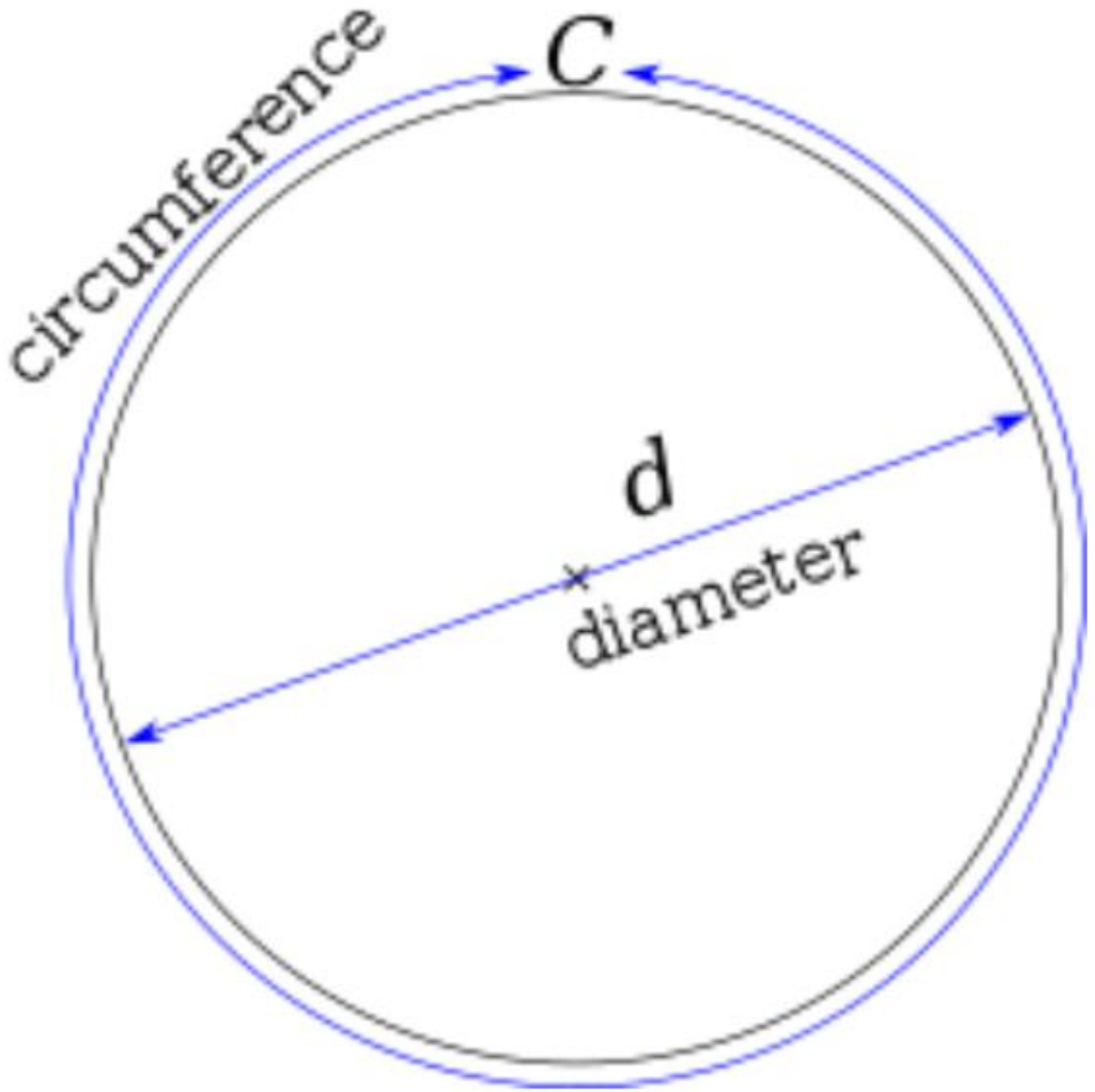
Times of Malta.com https://timesofmalta.com/articles/view/myth-debunked-the-shortest-distance-between-two-points.960497 June 12, 2022

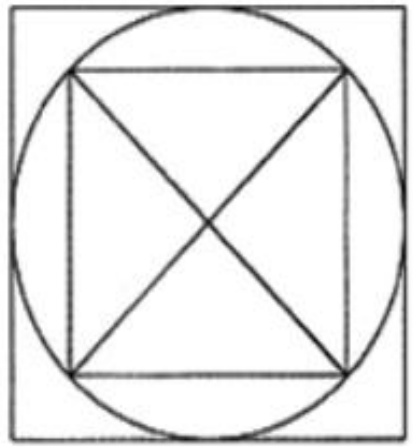

−4
−3
−2
−1
0
1
2
3
4

Square Root of 2 Is Constructed In Space of Two Dimensions

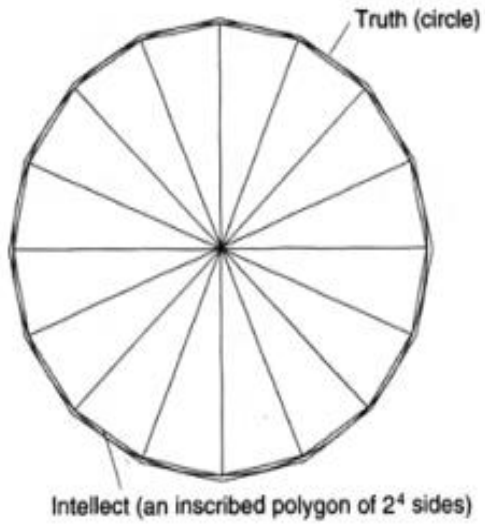


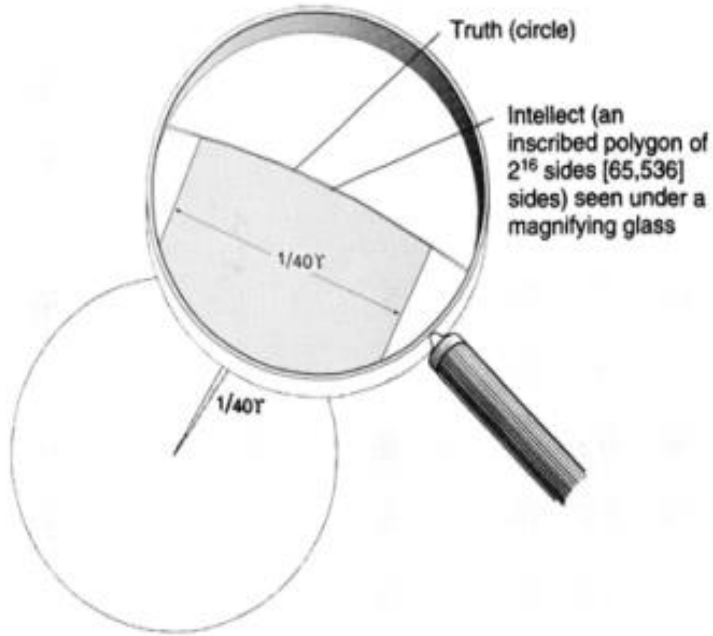
π Relation of Circumference to Diameter, C/D





"The intellect is to truth, as an inscribed polygon is to the inscribing circle. The more angles the inscribed polygon has, the more similar it is to the circle. However, even if the number of angles is increased ad infinitum, the polygon never becomes equal to the circle."





Nicholas of Cusa (1401-1464)

Vernadsky, working in the tradition of his predecessor D.I. Mendeleyev, and also of the circles of Louis Pasteur, made two, successive great discoveries of universal physical principle, discoveries which divided the domain of physical science and culture among three categorical sets of phenomena, each and all occupying and sharing the same universal physical space-time. These three were: the ordinary space of non-living physical chemistries; the phase-space defined by living processes and their products, called the Biosphere; and, the phase space defined by the products of those processes of the human mind which we should associate with the discovery and use of knowledge of universal physical principles, the Noösphere. Vernadsky defined both the Biosphere and Noösphere as belonging to the domain of a Riemannian manifold, a conclusion which placed Vernadsky in the same domain of intellectual work as his approximate contemporary, the Albert Einstein who traced all ordinary physical chemistry within the domain defined by the line of development of modern physical science, as rooted in the discoveries of Johannes Kepler, and as leading into the discoveries of Bernhard Riemann.

Lyndon H. LaRouche, **"The Rules of Survival"**
May 24, 2007

The universe is multiply-connected in the Riemannian sense. This has the essential implication, that the addition of a new principle to the manifold results in a change in the characteristic "curvature" of the manifold as a whole. This means, that the value, the impact of each such discovery, changes the value of each previously established type of action within the thus-unfolding manifold. So, for example, a successful such change within the technology of a society, will tend to increase the effective productivity of even those forms of action which are not themselves changed otherwise. So, a genuine improvement in the basic economic infrastructure of a society, increases the productivity of otherwise unaltered modes of productive action within the society as a whole. By definition, no mathematical model of the Descartes-Newton type could represent such connections and effects.

Lyndon H. LaRouche, **"A Lawless USA Today: Faith, Hope, And Agapé!"**
May 13, 2001

Once we establish the principle, that life is a distinct class of universal physical principle, not sprung from non-living processes, certain conclusions follow. Vernadsky's approach to the reading of the significance of natural products, is referenced. In a developmental process, of the type represented implicitly by a Riemannian manifold, the existence of established conditions (such as may be represented by certain arrays of natural products), makes it feasible for the principle to express itself as certain species and varieties…

The argument is essentially the same which Leibniz made, respecting the principled character of the existence of a species of any class, in his monadology. The principled precondition for any class of universal physical principle, always existed in the universe; but, the expression of that principle in any other way, can occur, only as the preconditions for that "activate" the principled potential as an actuality.

That said, and its implications taken into account, functional considerations intrinsic to the science of physical economy, oblige us to regard what we term basic economic infrastructure, as part of the biosphere, whether that is produced without human intervention, or only by human intervention. Basic economic infrastructure, so defined, has two general, functionally defined sub-classifications. In the simplest case, man causes needed conditions of human life, as through forest management, water-management, sanitation, and so on, to proliferate where the needed conditions would

not be developed without human intervention. In the alternate case, such as transportation systems, power production and distribution, and development of urban infrastructure, man adds new types of elements to what human existence at that level of development treats functionally as it treats the fostering of conditions typical of the pre-human definition of the biosphere.

As is most simply illustrated by the role of transportation and production and distribution of power, the development of the biosphere, as including such elements, creates a physical economic geometry in the economy as a whole. Basic economic infrastructure does more than merely sustain life and necessary productive activities. It has the effect of a change in the Riemannian physical geometry of the economic process as a whole. The included result of this effect is an increase in the per-capita productive powers of labor, even without any improvement in the internal features of that production itself. In other words, the geometry in which the productive act is situated has been changed. The effect is implicitly a change in characteristic curvature of the manifold in which productive activity occurs, such that the net effect, is an increase in the productive powers of labor, even when no change has introduced to the performance of that labor, or the local productive process itself. These two combined types of willful changes in the biosphere are measurable, at least implicitly so, as natural products of the noosphere.

Lyndon H. LaRouche, **"A Lawless USA Today: Faith, Hope, And Agapé!"**
May 13, 2001

Although nonliving processes are apparently entropic, relative to the characteristic anti-entropy of living and cognitive processes generally, this does not signify that the non-living aspect of the universe is actually entropic, since, of course, he universe in which the non-living aspect is manifest, is also anti-entropic as a whole, especially when living and cognitive processes are taken into account.

Lyndon H. LaRouche, **"A Lawless USA Today: Faith, Hope, And Agapé!"**
May 13, 2001