Dedicated to my son, Peter

Ode To Mathematics

based on

Morris Kline's Mathematics in Western Culture

Irving Schlein

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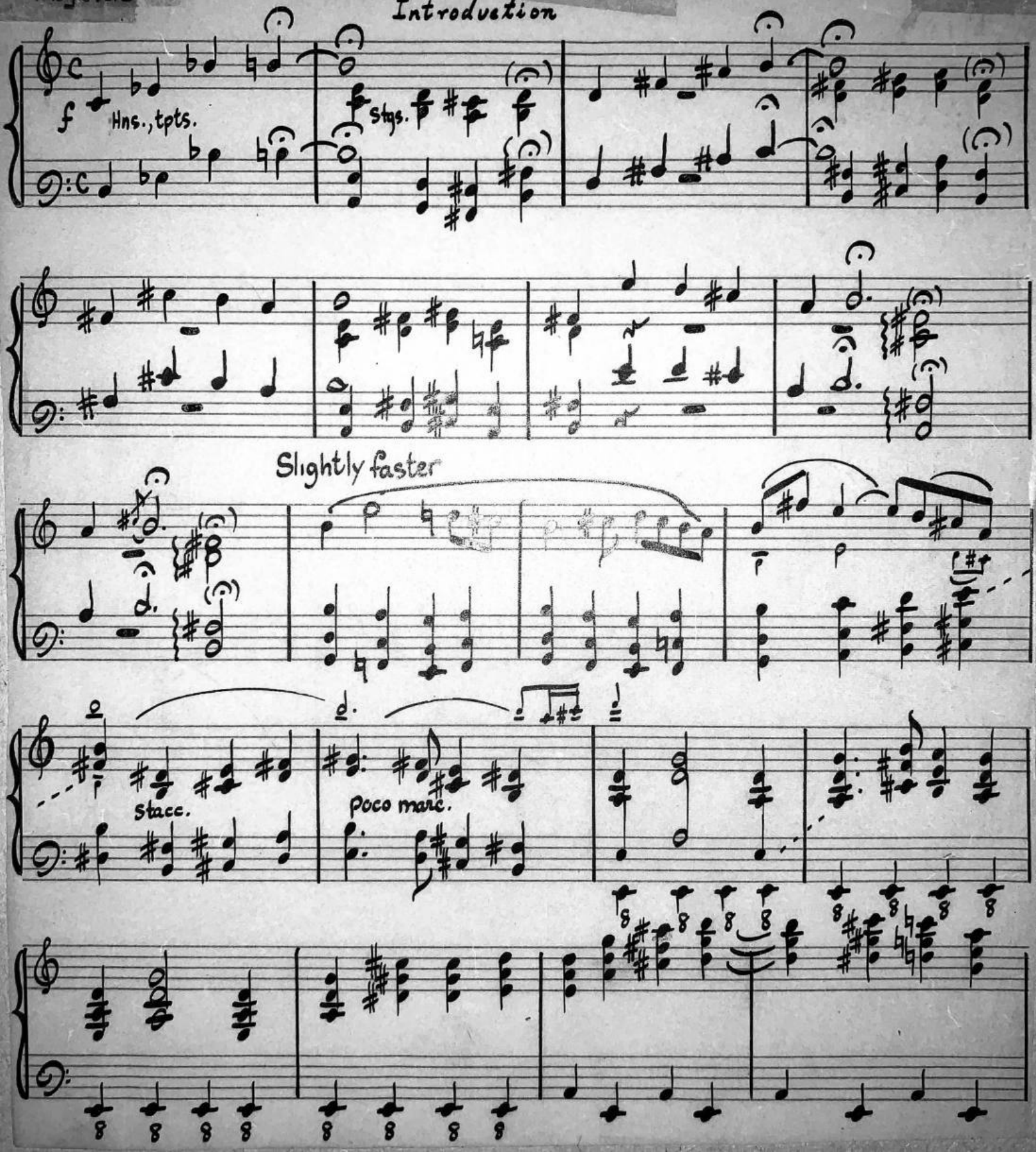
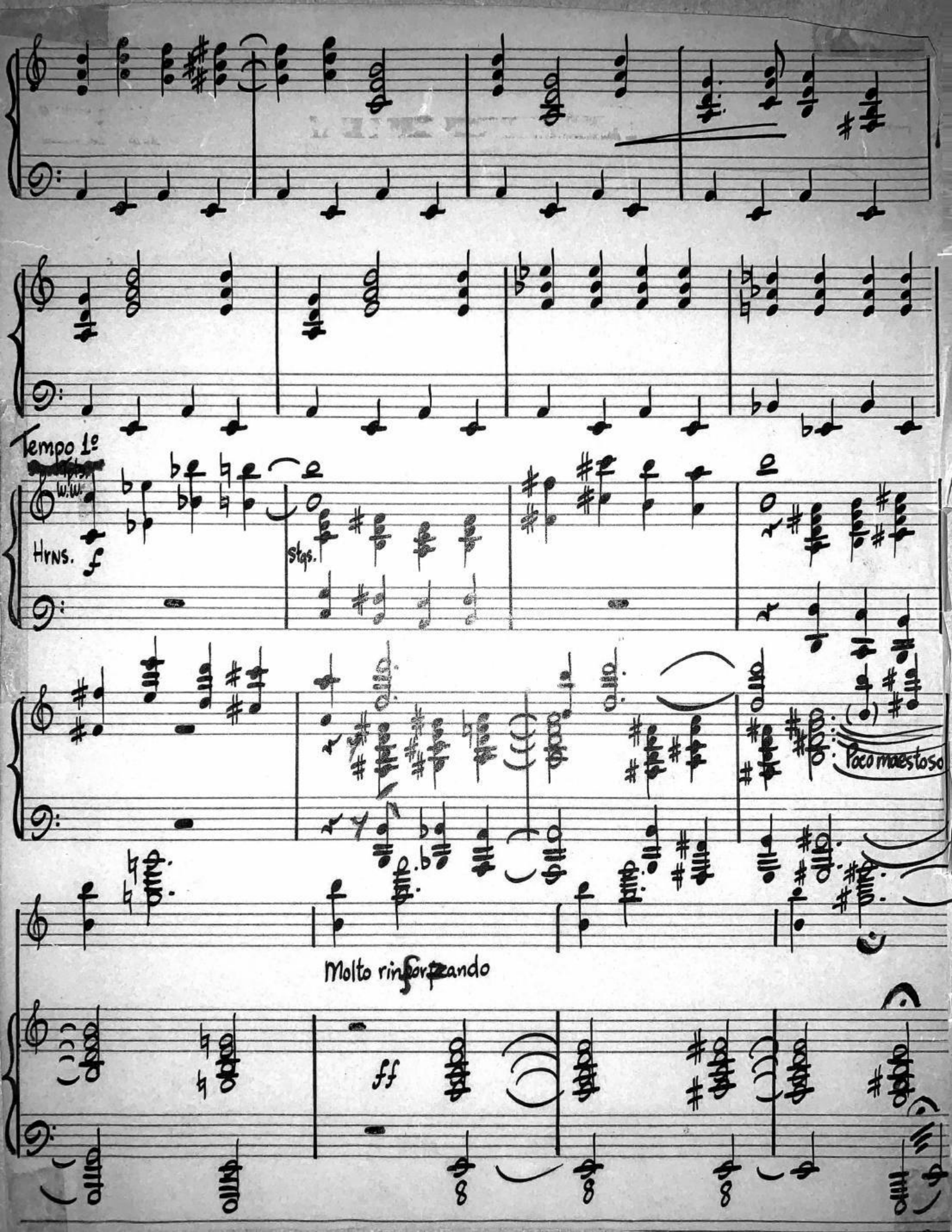
Majestic

Introduction




Tempo 1º
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f
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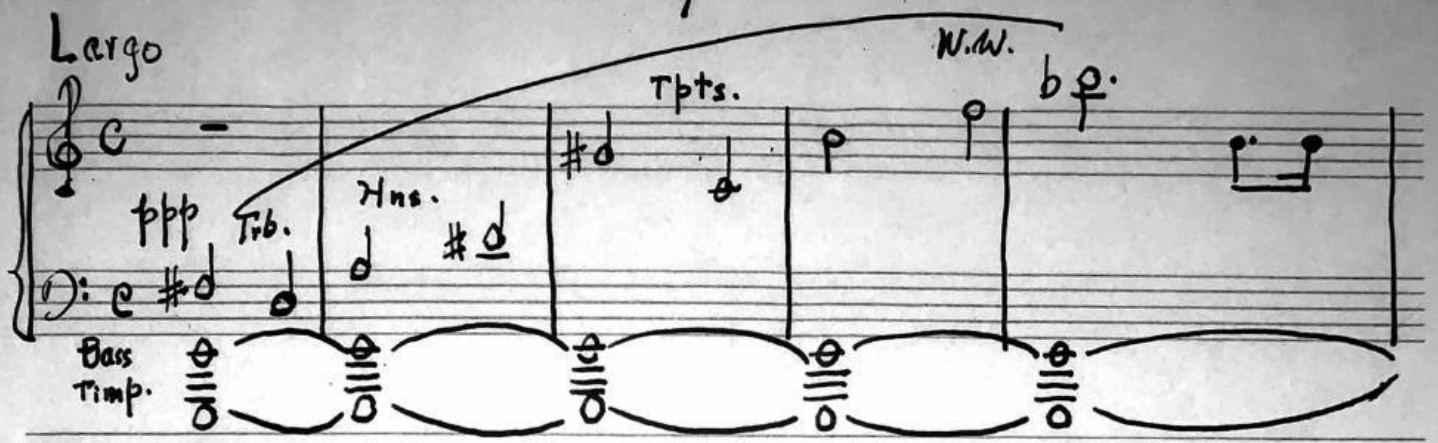
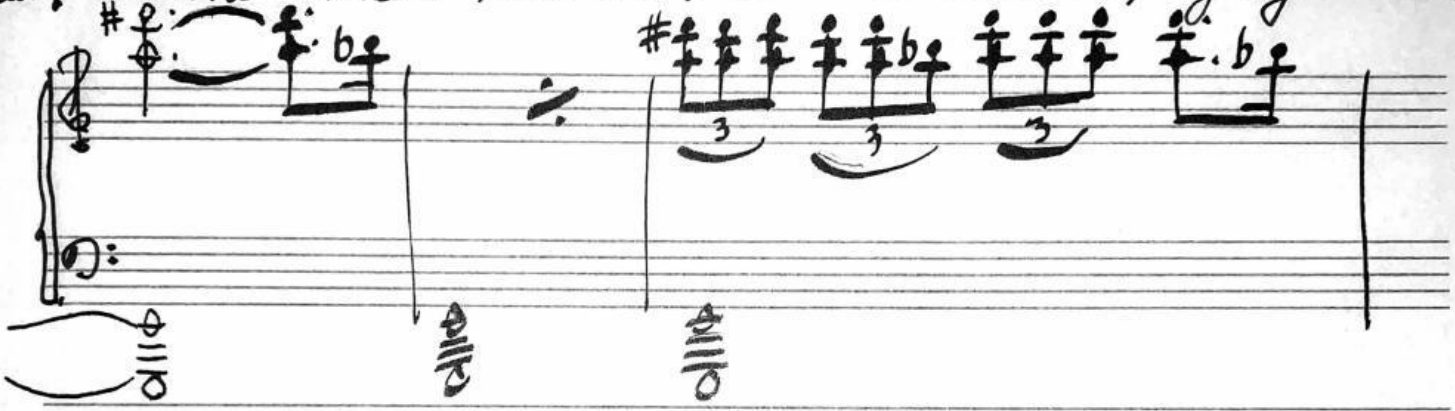
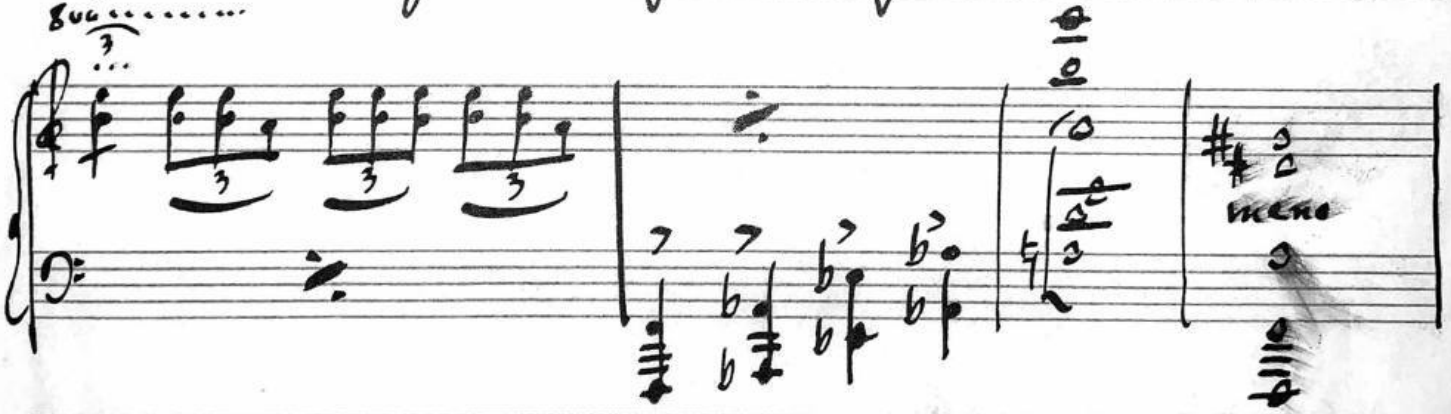
Poco maestoso
Molto rinforzando
ff



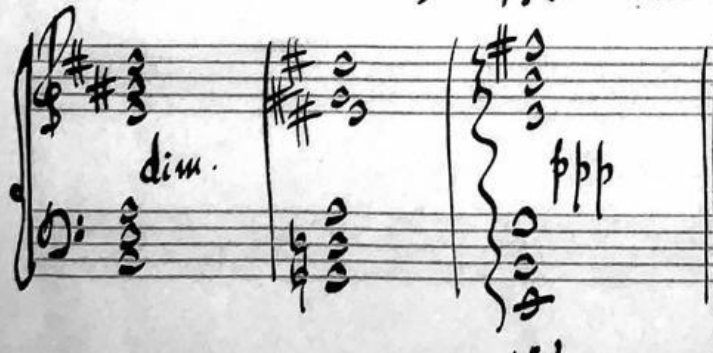
"Narrator: Bertrand Russell tells us that 'mathematics, rightly viewed,



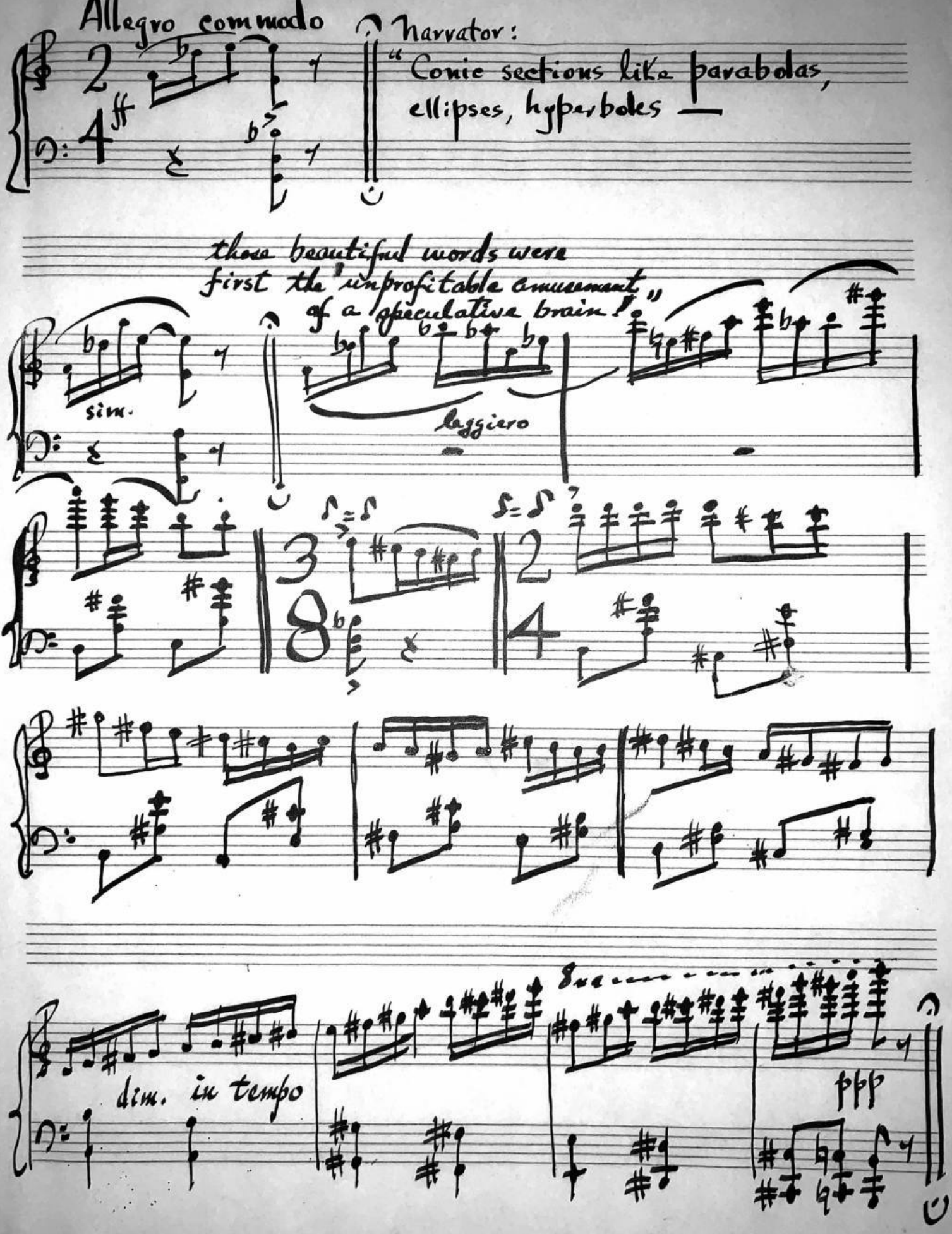
possesses ... supreme beauty – a beauty cold and austere,



like that of sculpture, without appeal to any part of our weaker nature; without the gorgeous trappings of

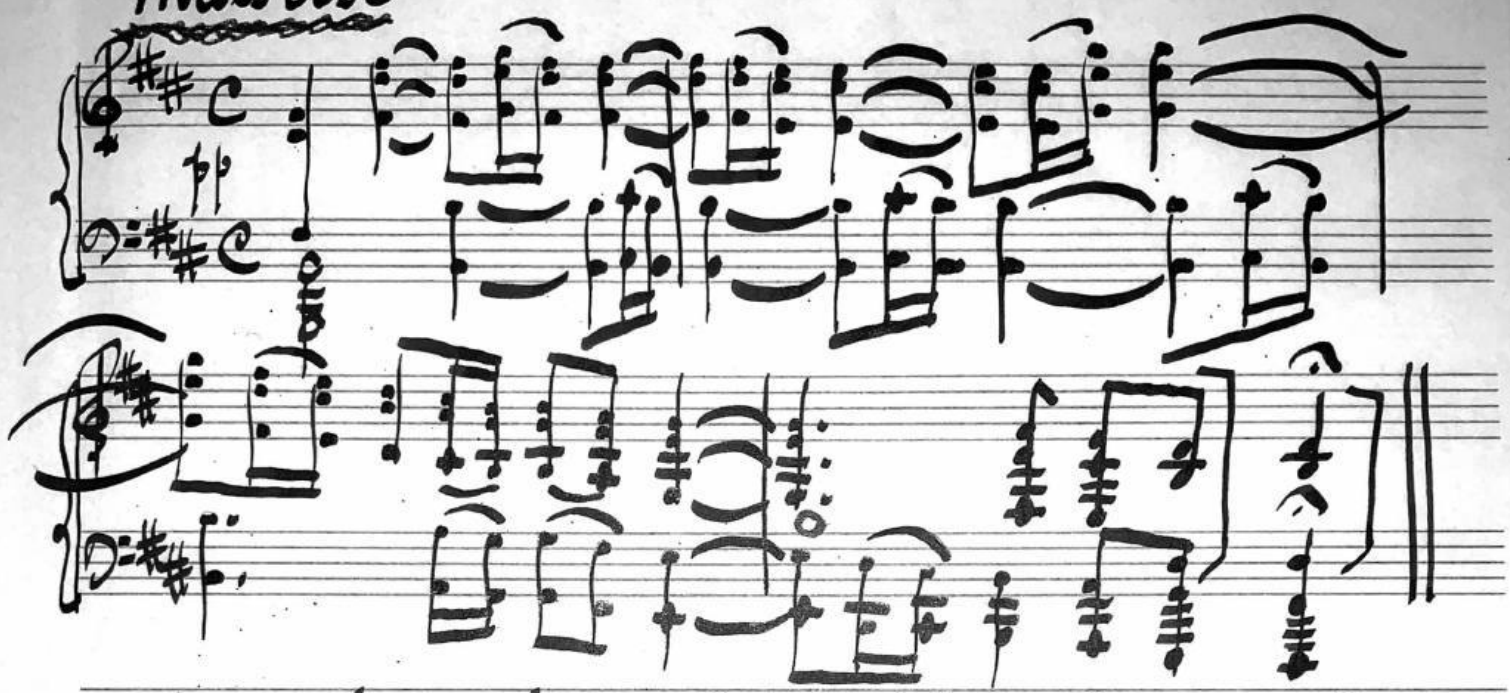


painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exhaltation, the sense of being more than man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as in poetry.'"


Allegro commodo
Narrator:
"Conic sections like parabolas,
ellipses, hyperboles
those beautiful words were
first the "unprofitable amusement
of a speculative brain!"
sim.
leggiero
dim. in tempo
ppp

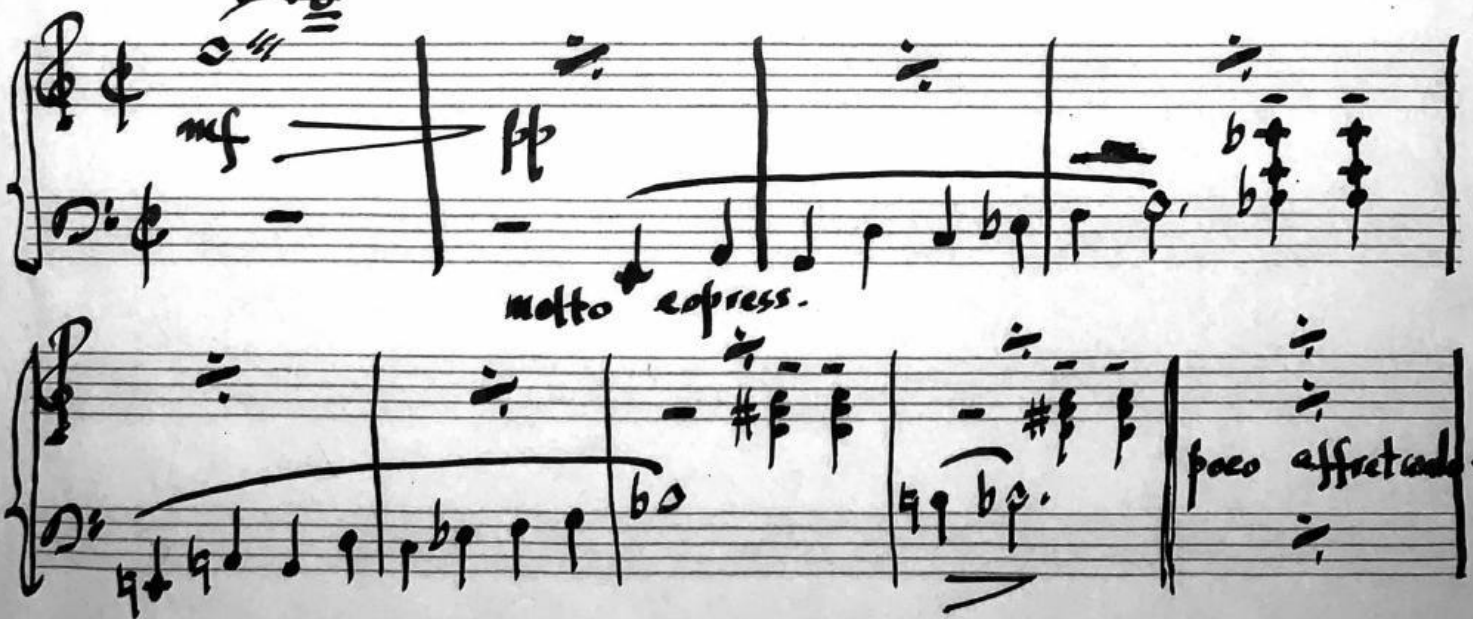
"Mathematics is mastery over Nature, the spirit of rationalism.

Maestoso



Or in the words of Lord Kelvin: 'Do not imagine that mathematics is hard and crabbed and repulsive to common sense. It is merely the etherealization of common sense.'"

Slowly (♩=92)



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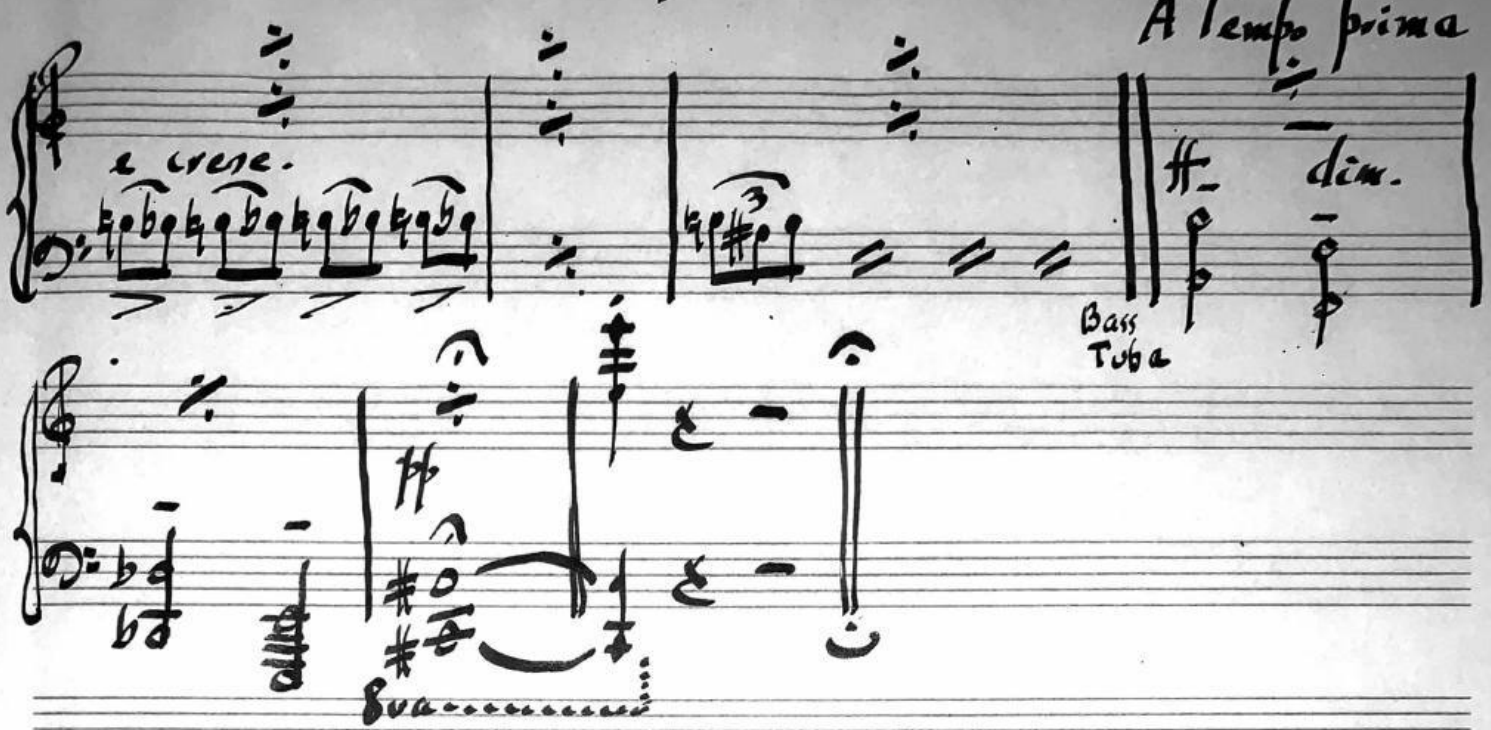
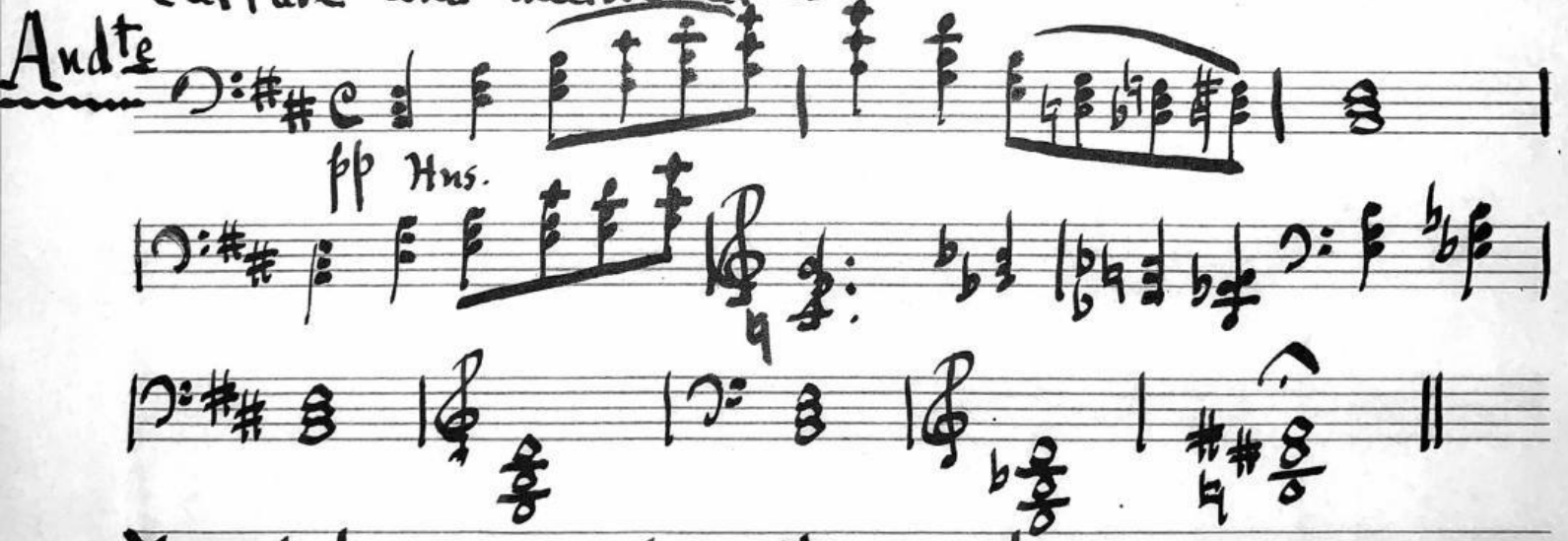


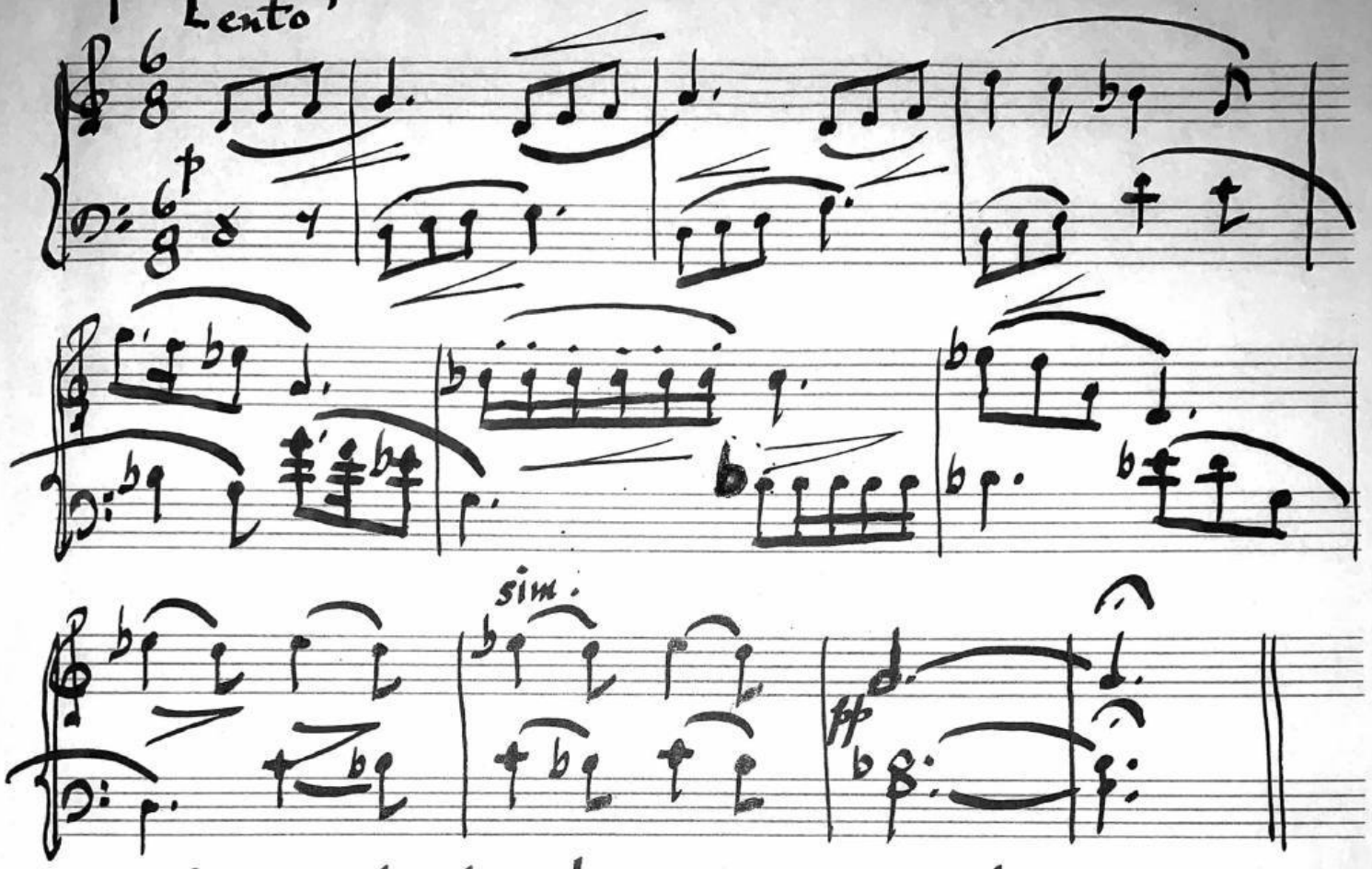
"Primitive civilization gave us addition, subtvaction, multiplicatio
and division. Egyptians and Babylonians gave us
culture and mathematics.



Knowledge of mathematics and science mean
power for mankind.

Deduction: All poets are intelligent
No intelligent person derides mathematics
No poet derides mathematics"

"Induction is part of experimental science in that repeated experiments lead to scientific conclusions.



The Greeks developed arithmetica, theory of numbers, and logistica, computation.

Plato said: 'geometry will draw the soul towards truth, and create the spirit of philosophy; arithmetic has a very great and elevating effect, compelling the soul to reason about abstract numbers, and rebeling against the introduction of visible or tangible objects into the argument.' He also told 'the principal men of our State to go and learn

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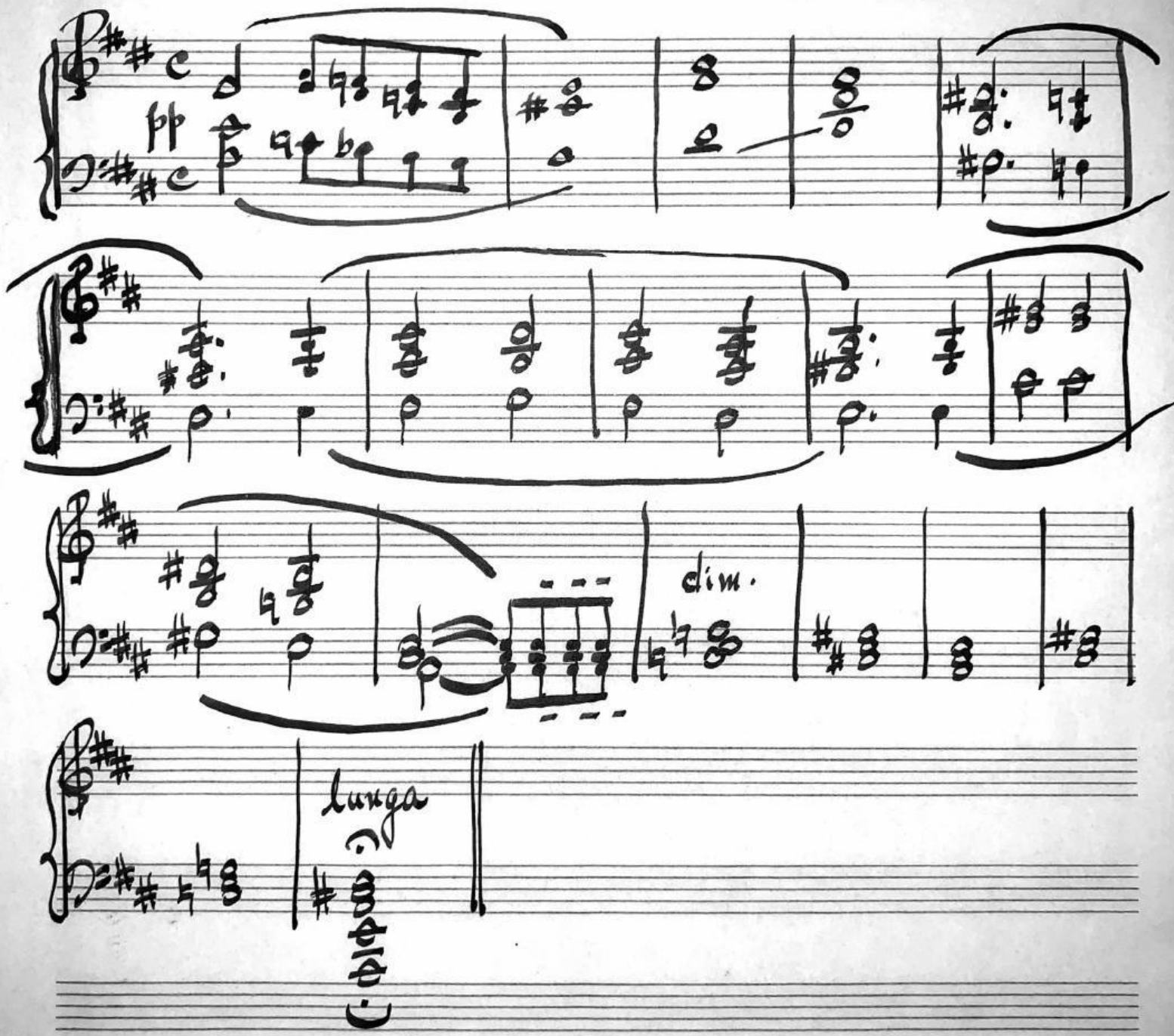
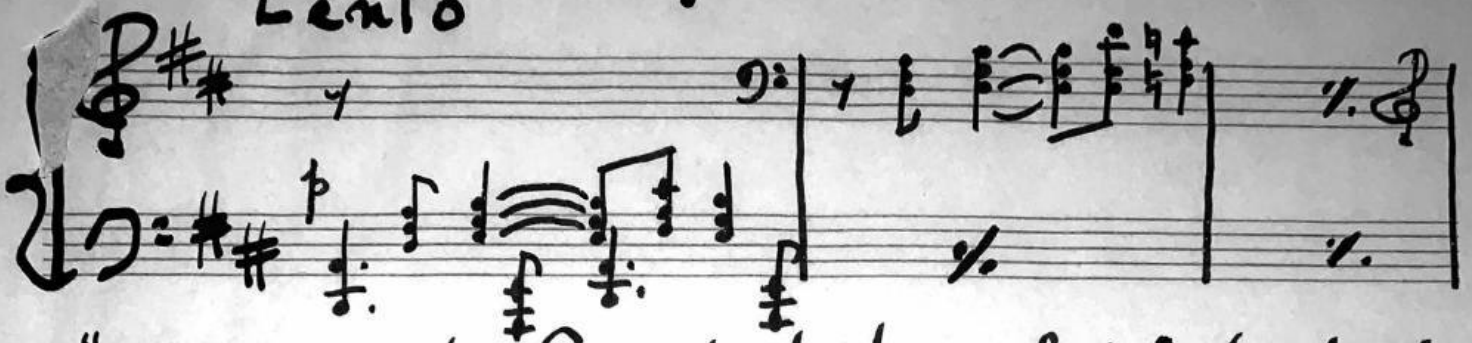
arithmetic, not as amateurs, but they must carry on the study until they see, the nature of numbers with the mind only."

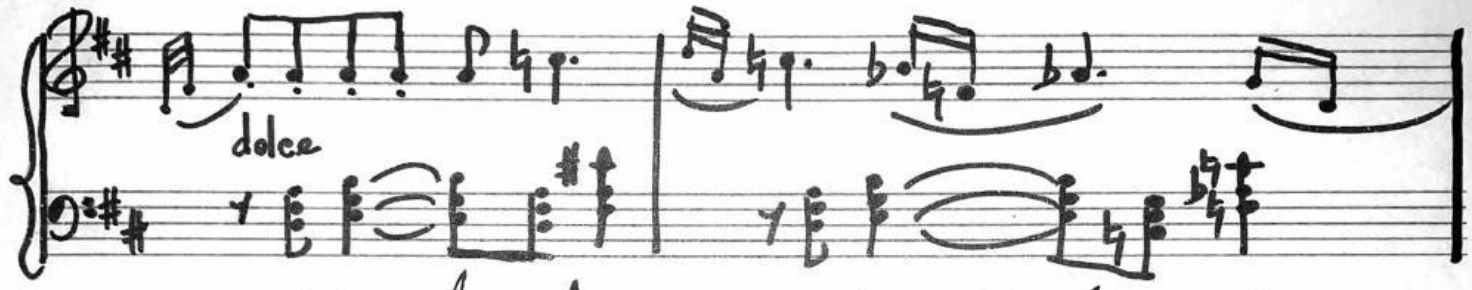
Lento



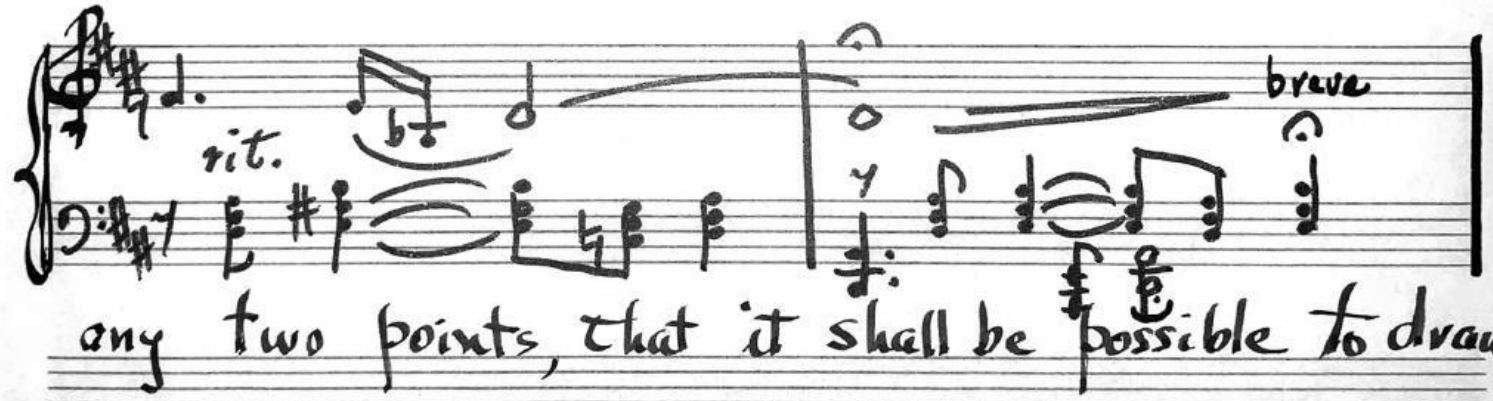
Lento



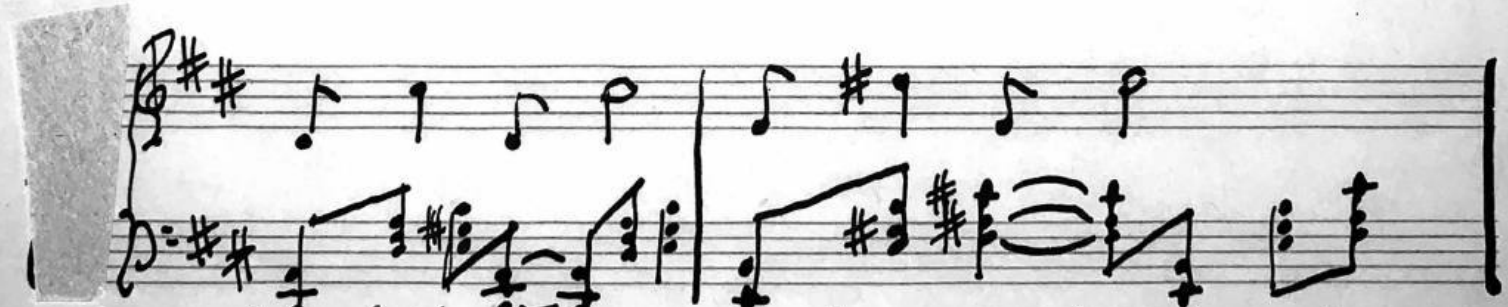
"The great Euclid told us that it shall



be possible to draw a straight line joining

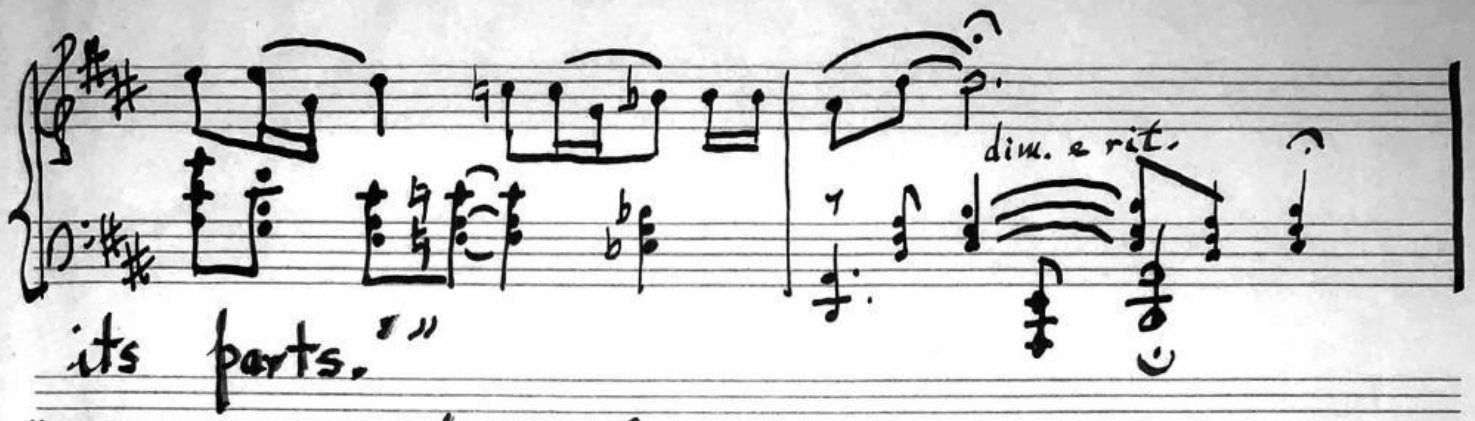


any two points, that it shall be possible to draw



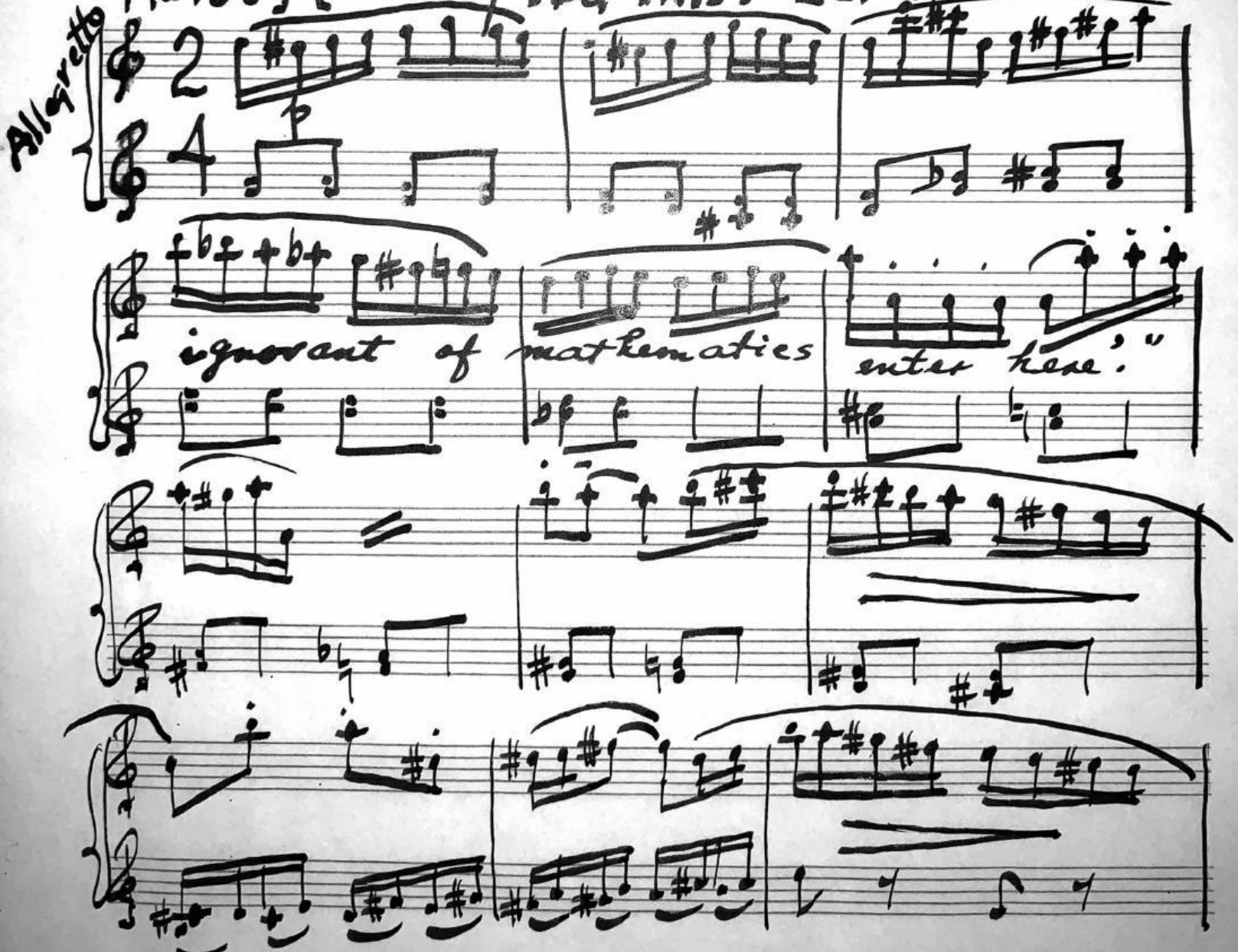
a circle with given center and through a

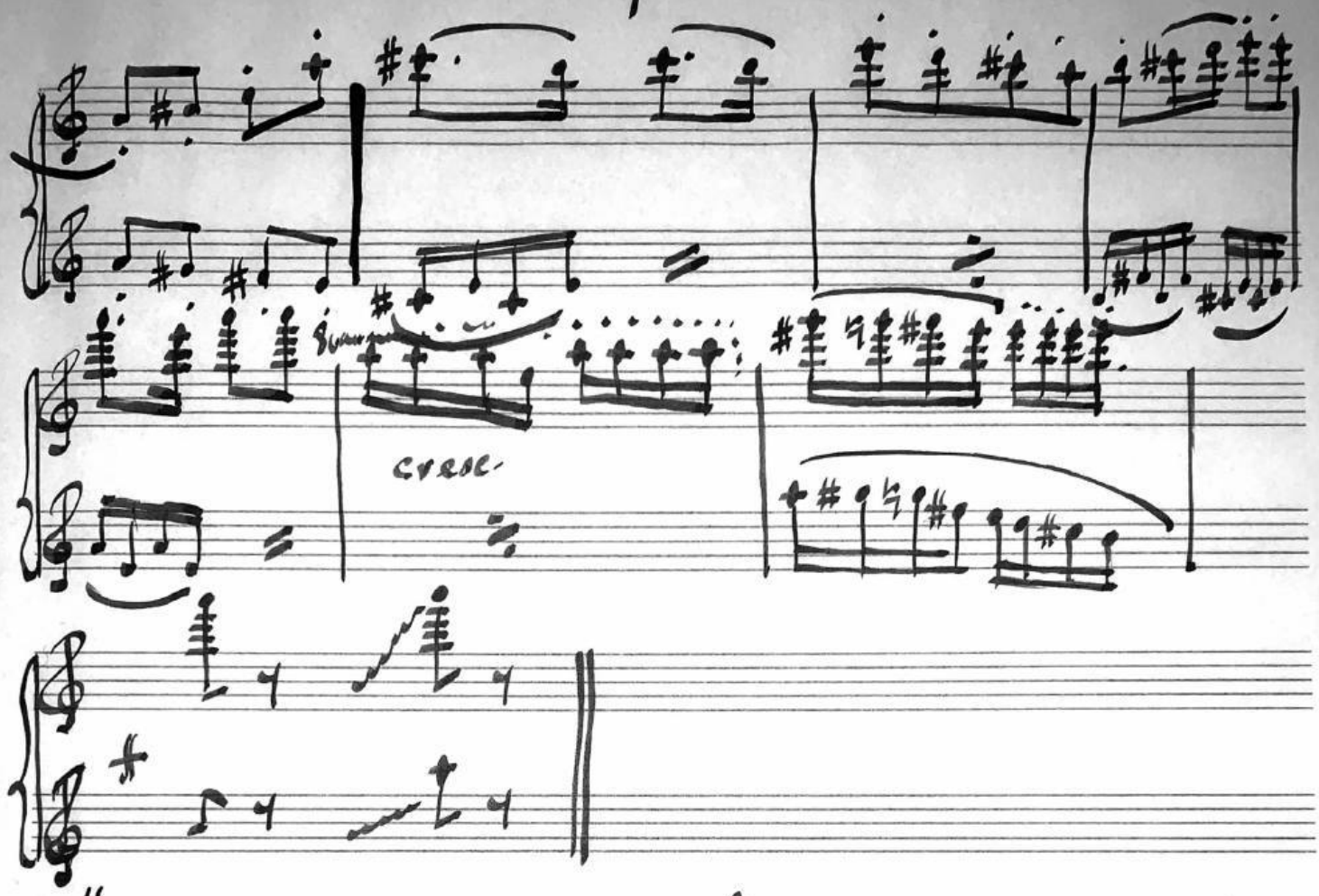
given point; the whole is greater than any of



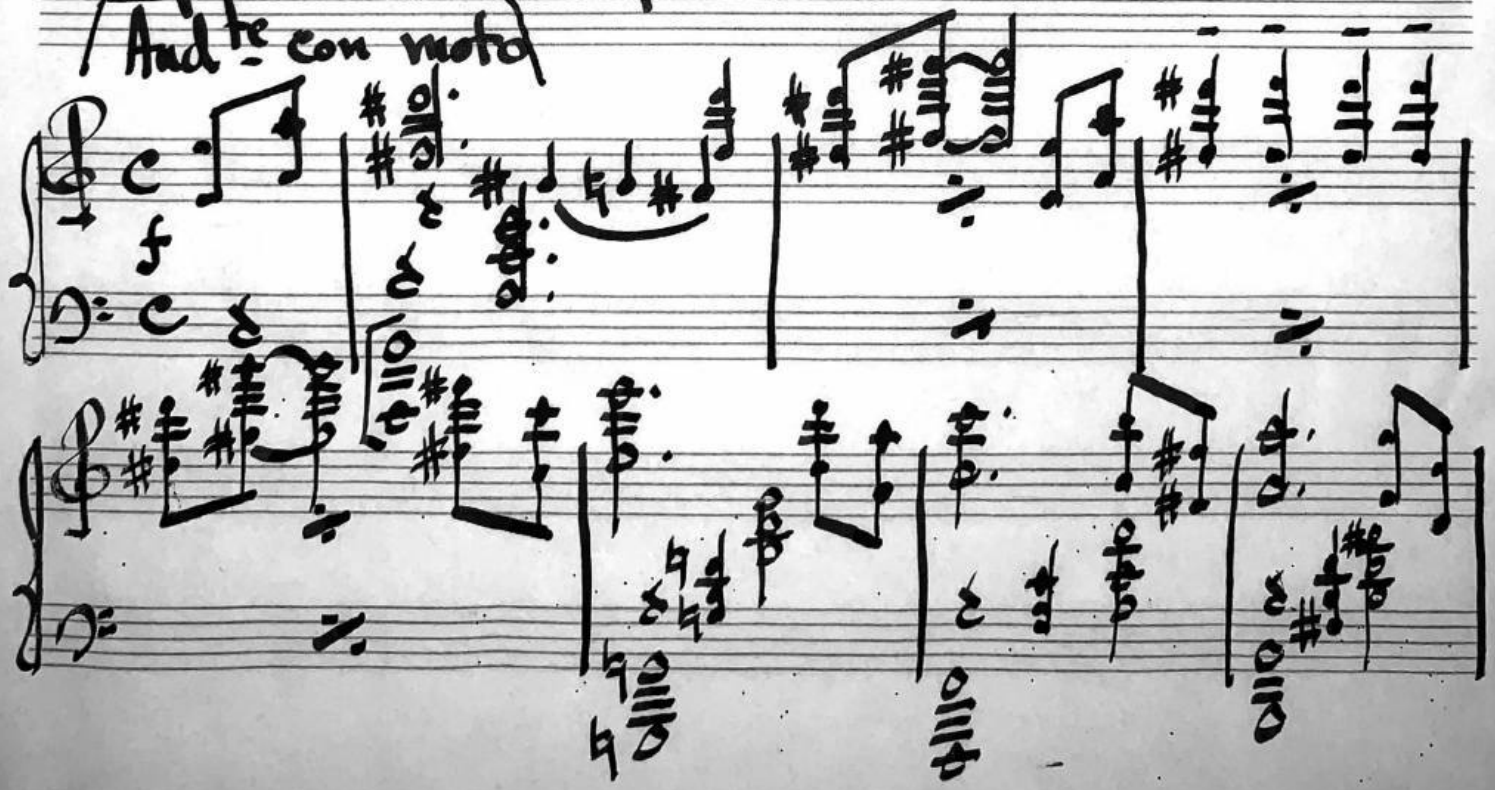
its parts."

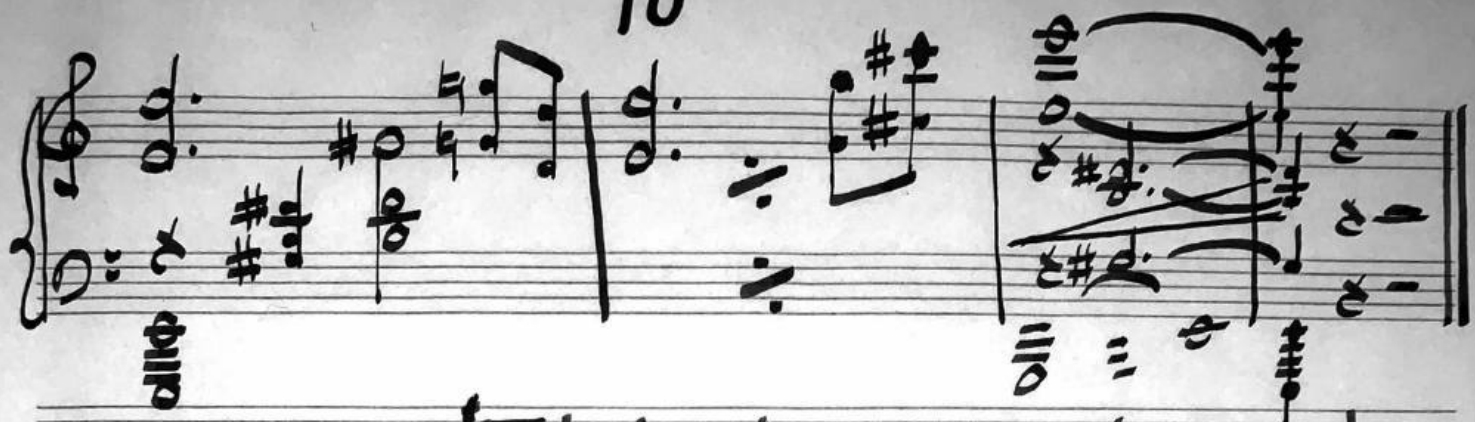
"Plato's Academy had this: 'Let no one





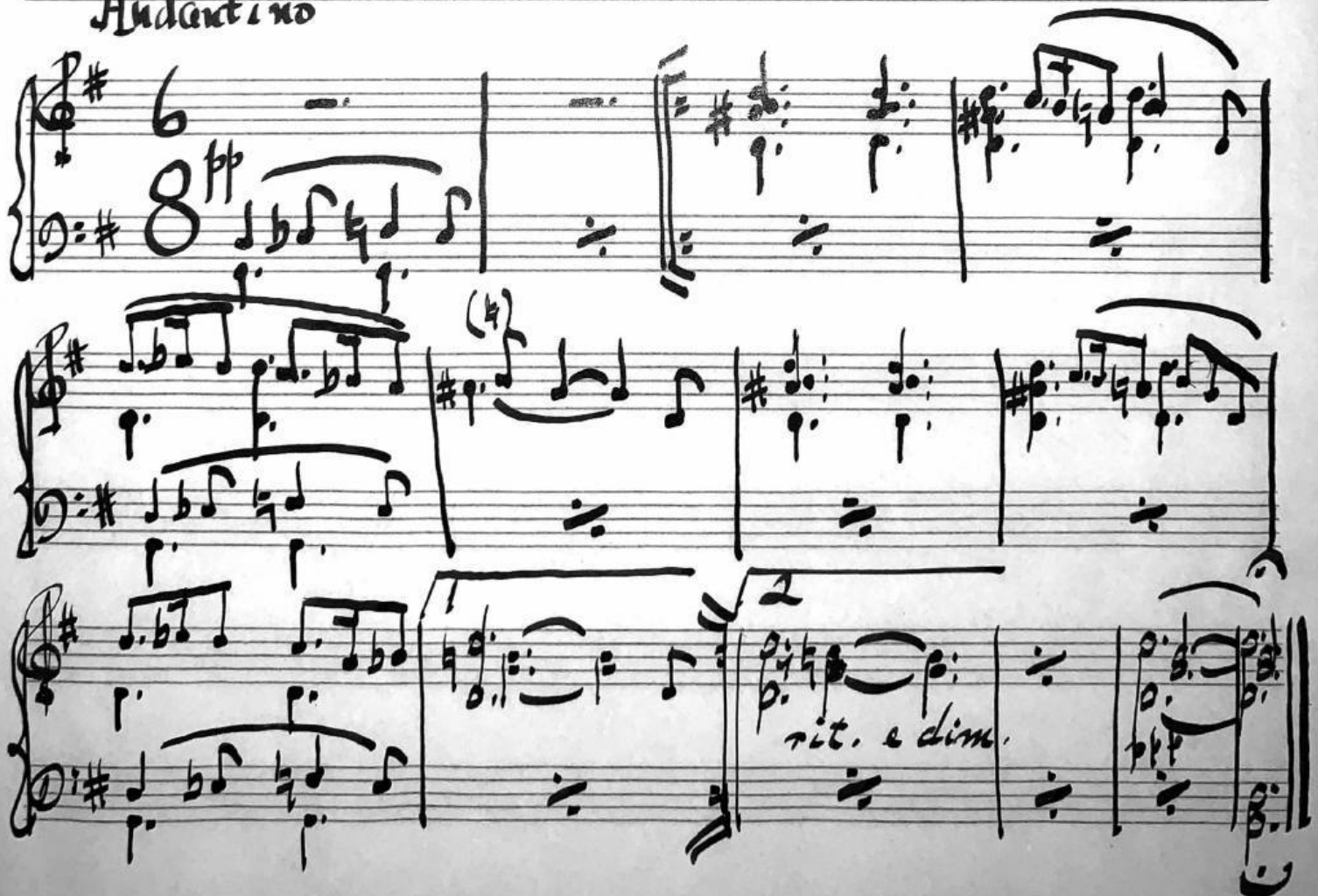
"Ptolemy! Eratosthenes! Archimedes!
Hipparchus! Diaphantus! — Thinkers, all!"





"Aristotle said: 'It is not everything that can be proved, otherwise the claim of proof would be endless. You must begin somewhere, and you start with things admitted but undemonstrable. These are first principles common to all peiences which are called axioms or common opinions.'"

Andantino



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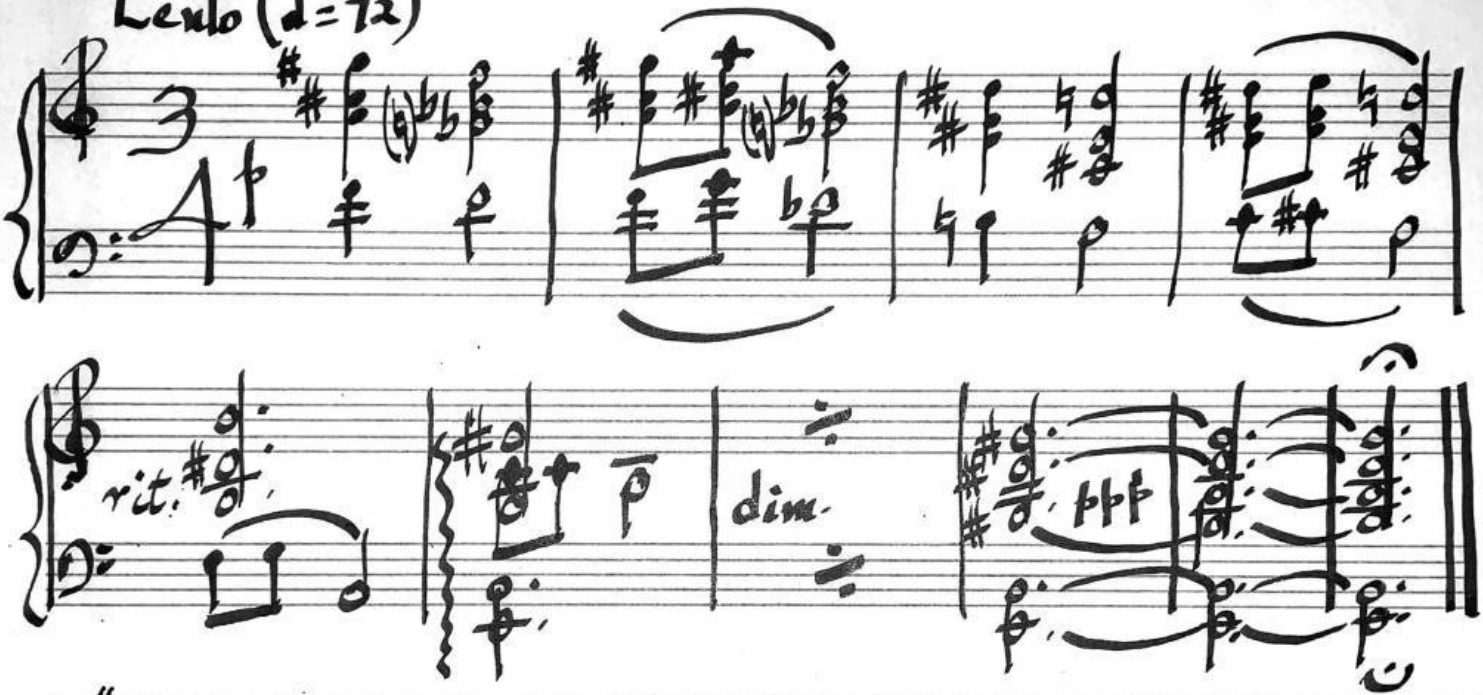
"Edna St. Vincent Millay pays tribute to a great thinker:

'Euclid alone
Has looked on Beauty bare. Fortunate they
Who, though once only and then but far away,
Have heard her massive sandal set one stone.'

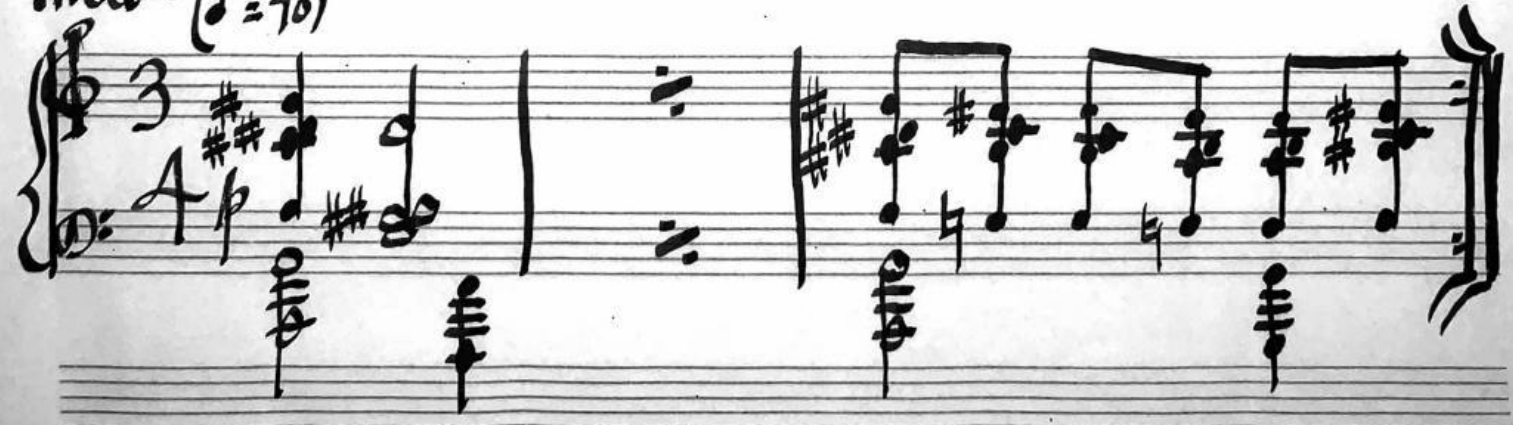
Lento (♩=72)

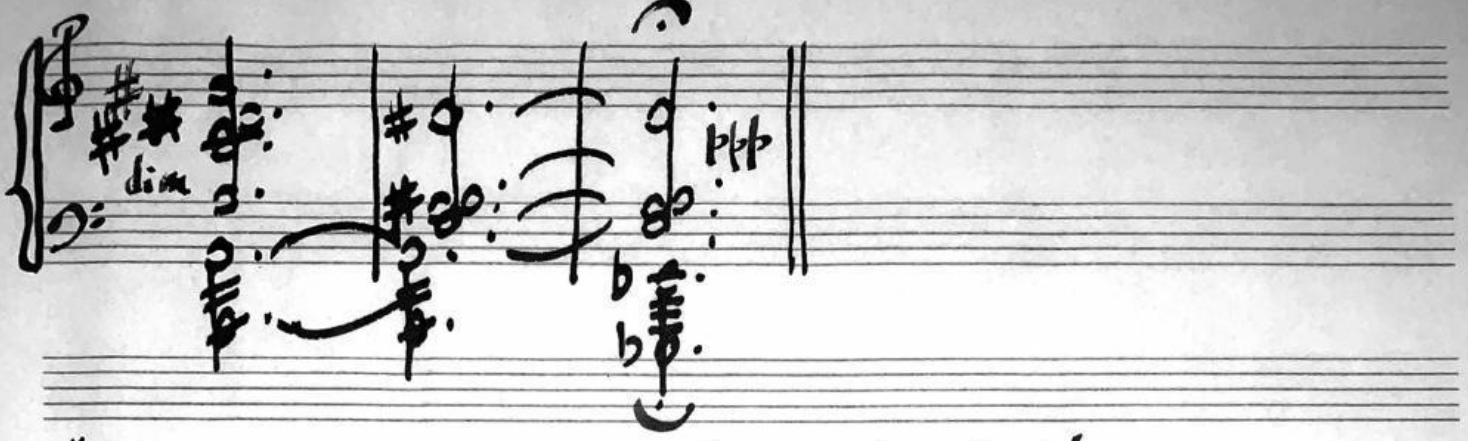


"Archimedes proclaims that:

'A body immersed in water is buoyed up by
a force equal to the weight of the water displaced.'"

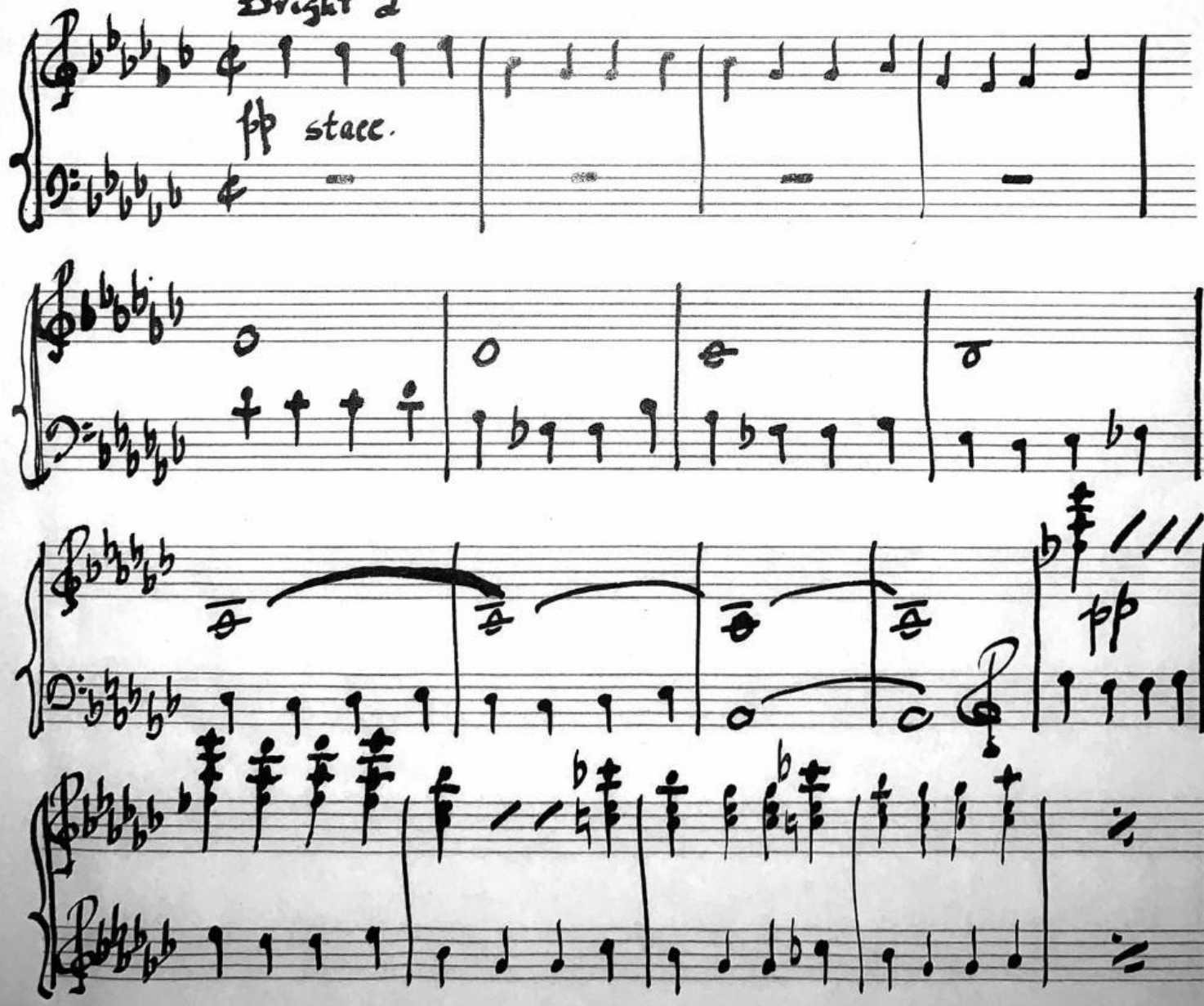
Mod^to (♩=70)

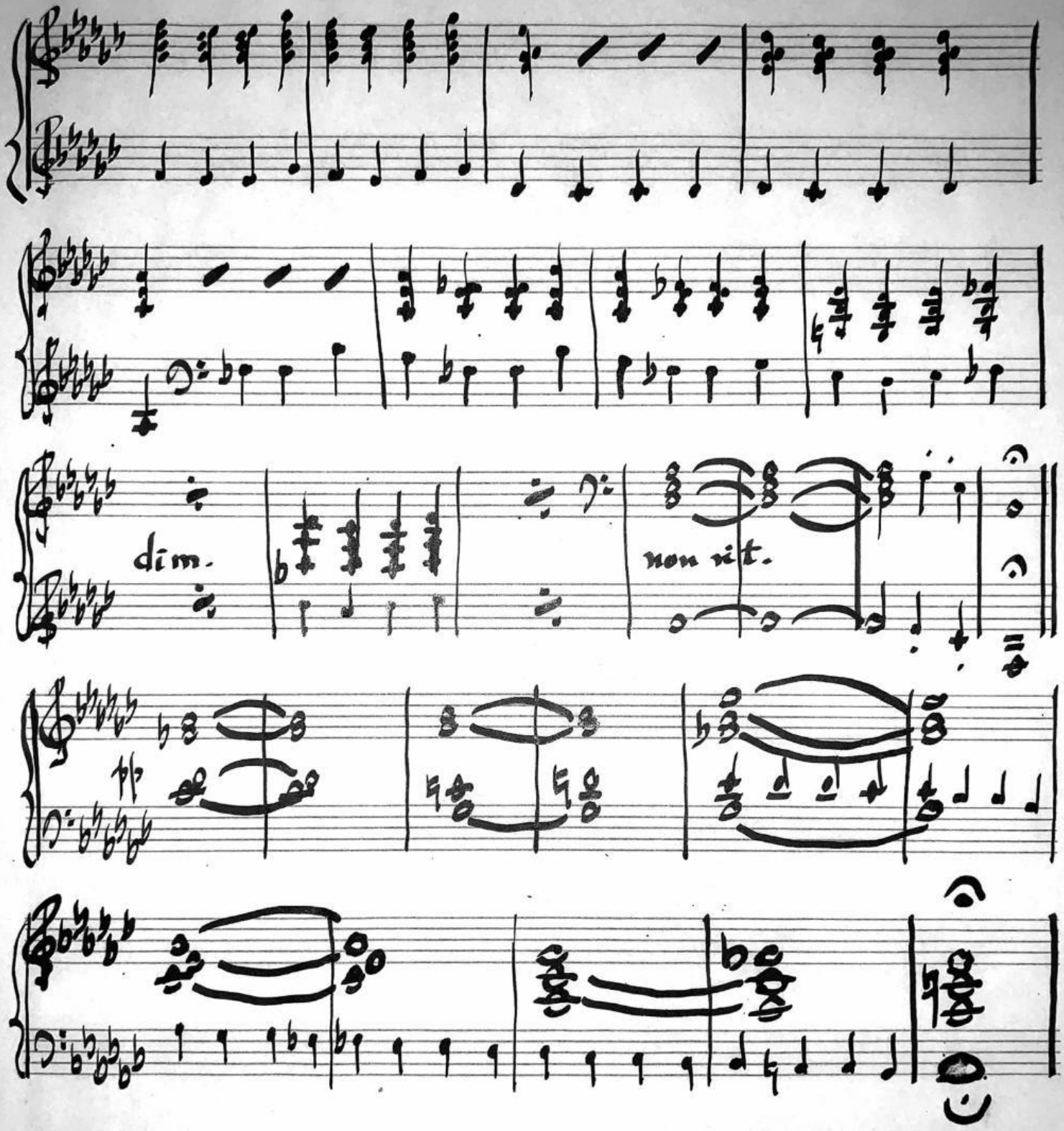




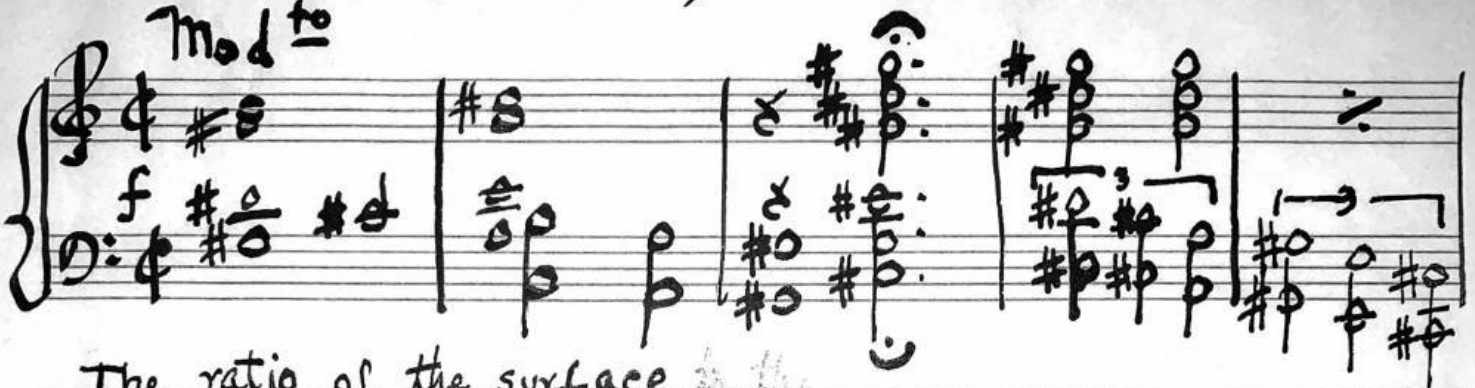
"The area of a circle is half the circumference times the radius: πr^2"

Bright 2

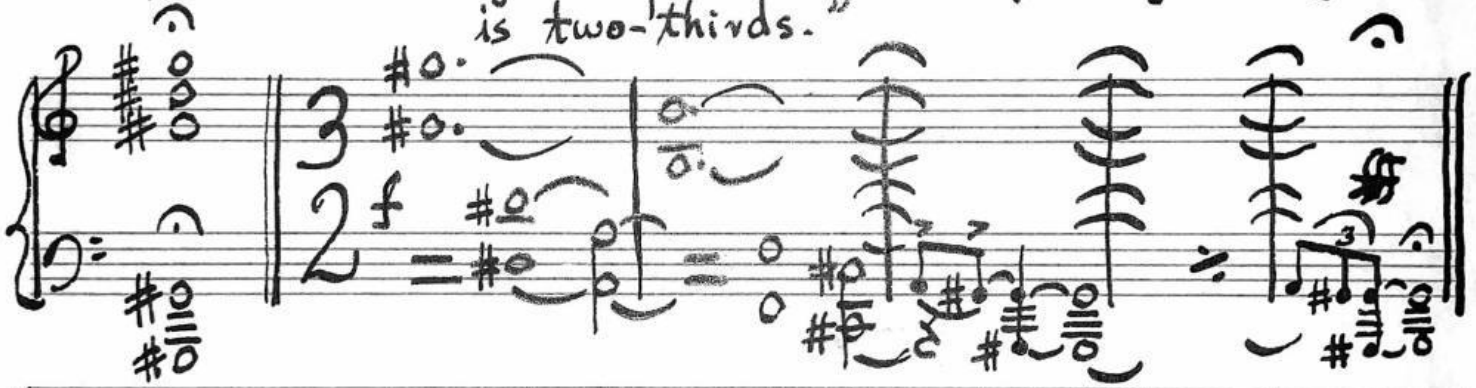



dim.
non rit.

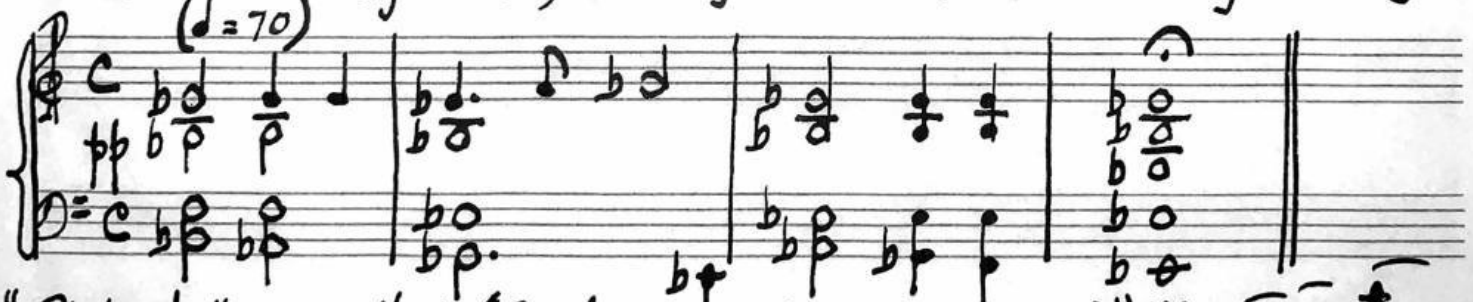
"The ratio of the volume of a sphere inperibed in a cylinder to the volume of the cylinder is as two is to three;



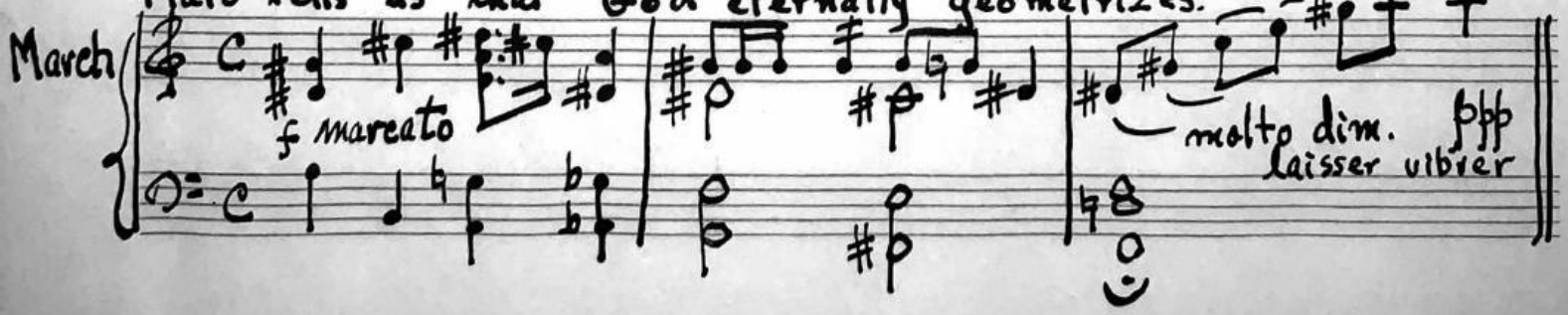
The ratio of the surface of the sphere to the surface of the cylinder is two-thirds."



"Pythagoras avers that 'nabura should be interpreted in terms of number" — Of music, he says it "is the essence of reality."



"Plato tells us that "God eternally geometrizes."



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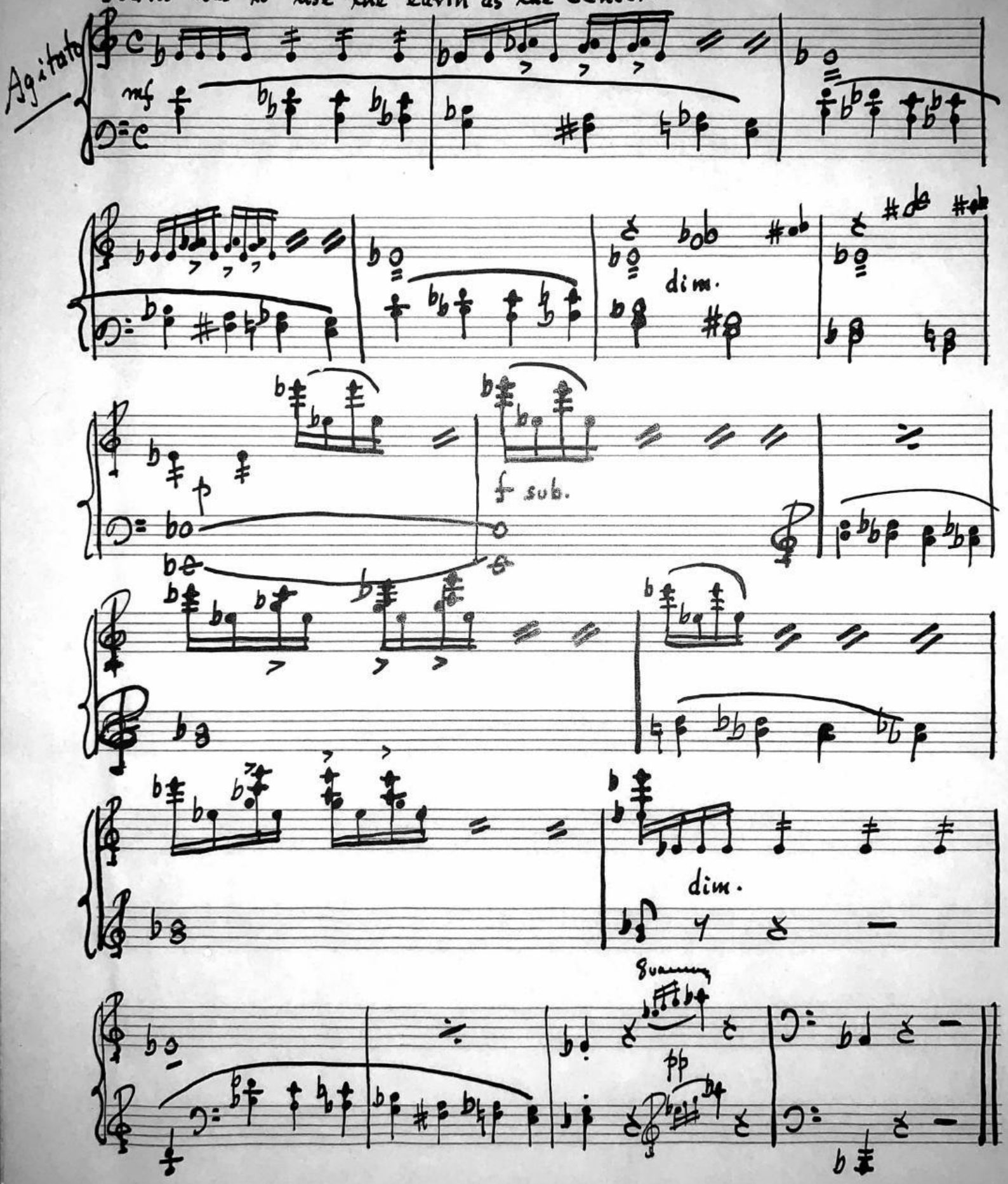
"Eudoxus' scheme for describing and predicting the motions of the heavenly bodies was to use the earth as the center."



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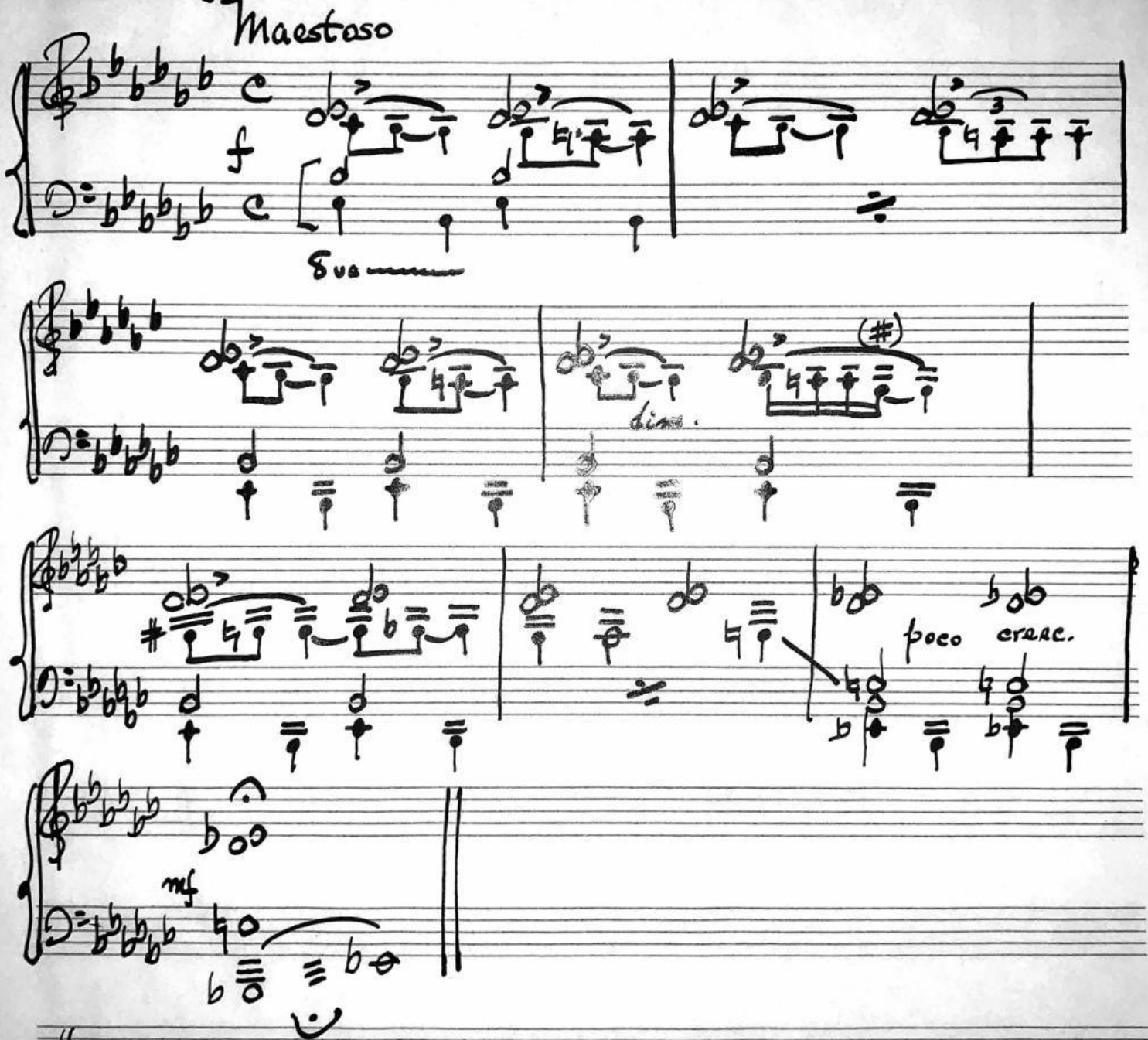
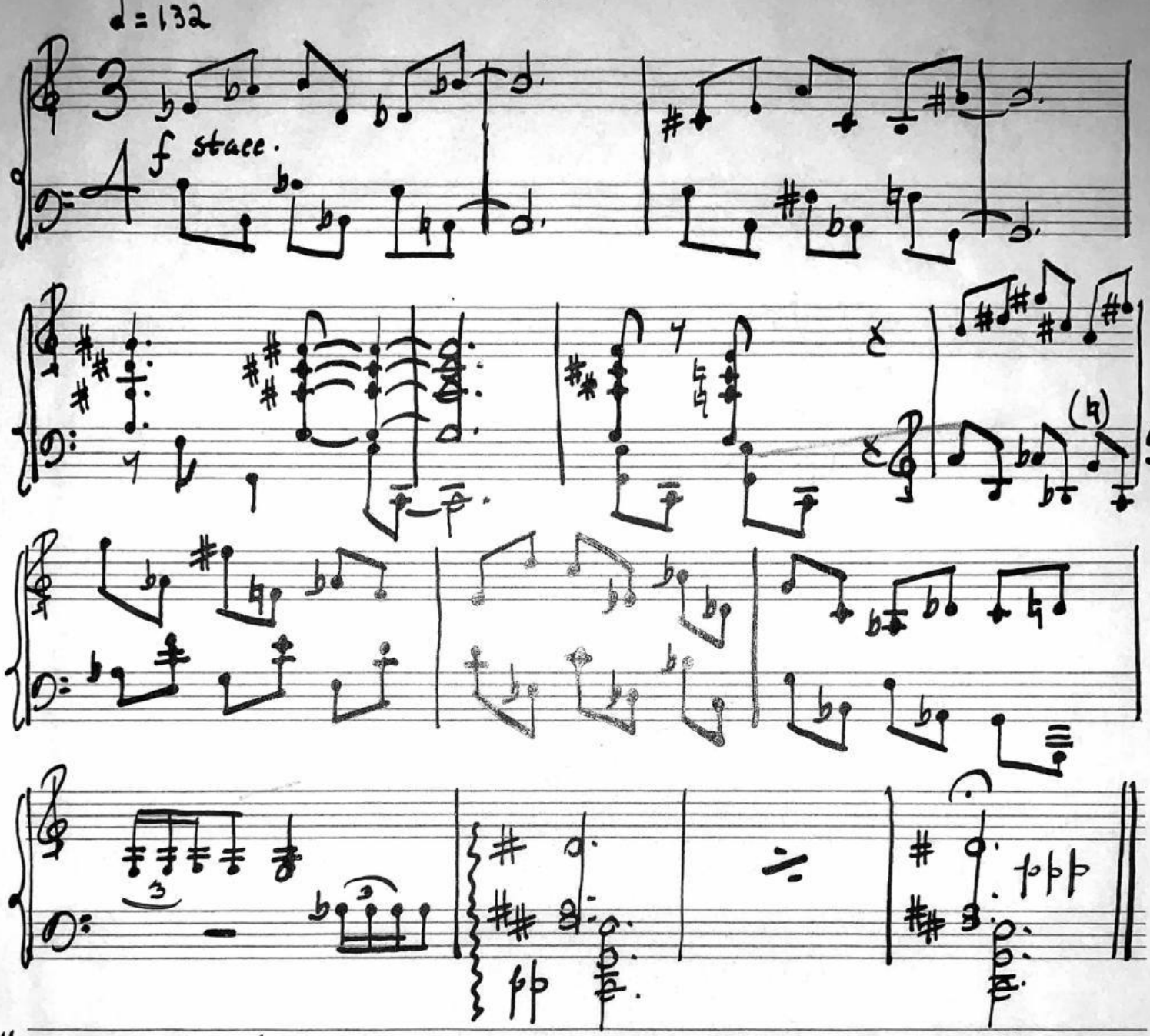
"Scientists have suffered physical torture for adhering to principles. Hypatia: the mathematician, who refused to abandon Greek religion, was torn limb from limb—"



"Cardan — mathematician, physician, metaphysician, cheat, gambler, murderer, adventurer!"



"Descartes: 'It is possible to attain Knowledge which is very useful in life ... we may find a practical philosophy by means of which ... we can ... render ourselves the masters and possessors of nature...'"

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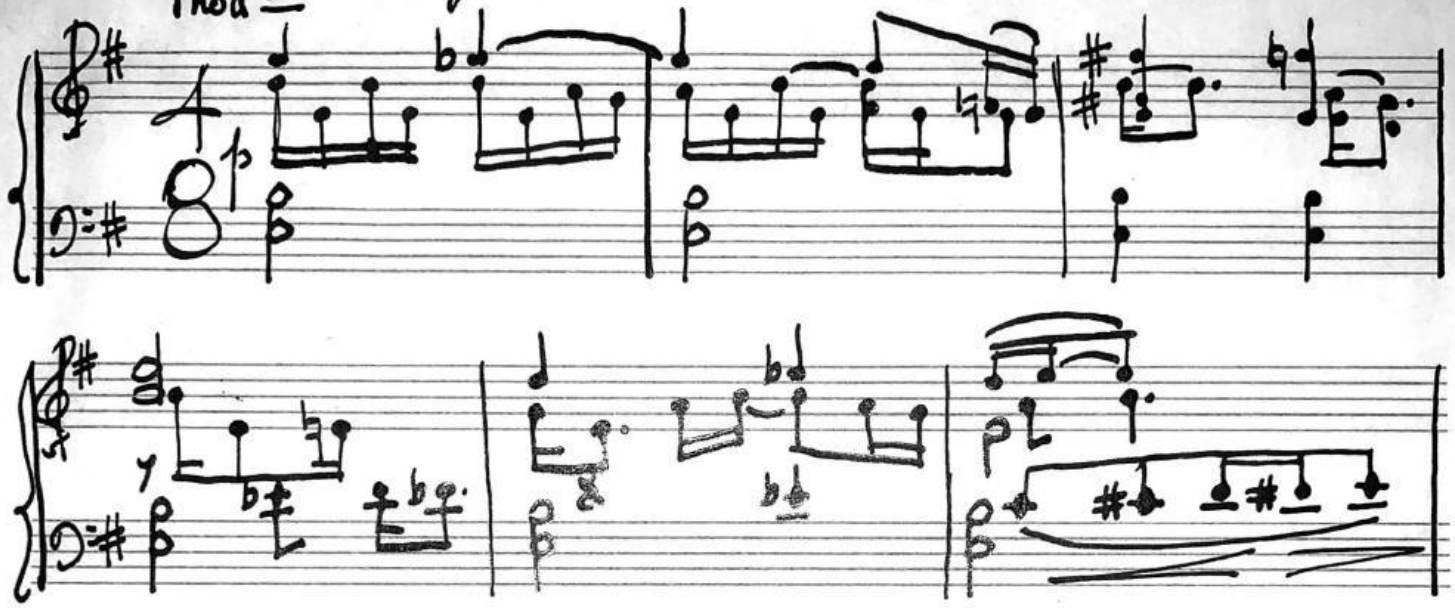
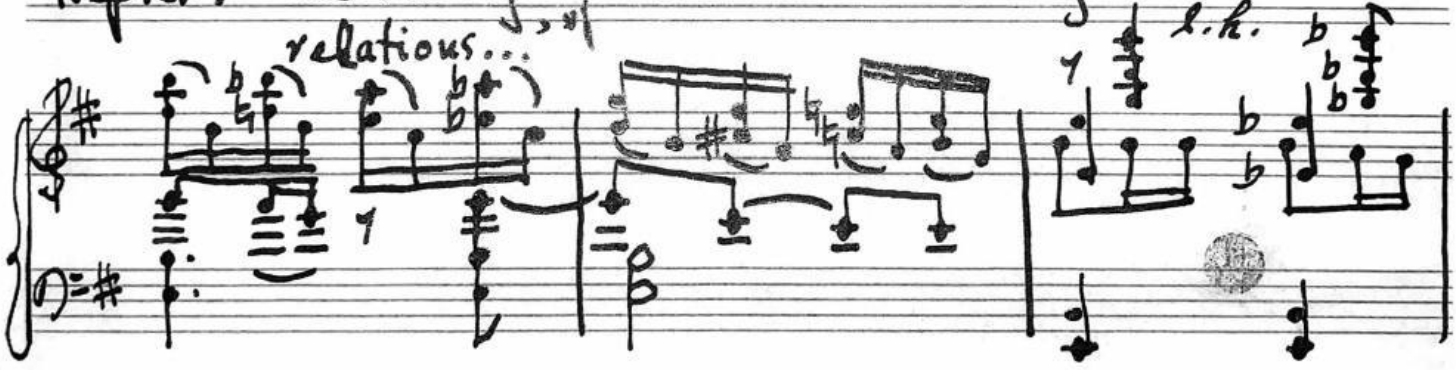
"Galileo: 'Mathematical principles are the alphabet in which God wrote the world...'"

Mod to

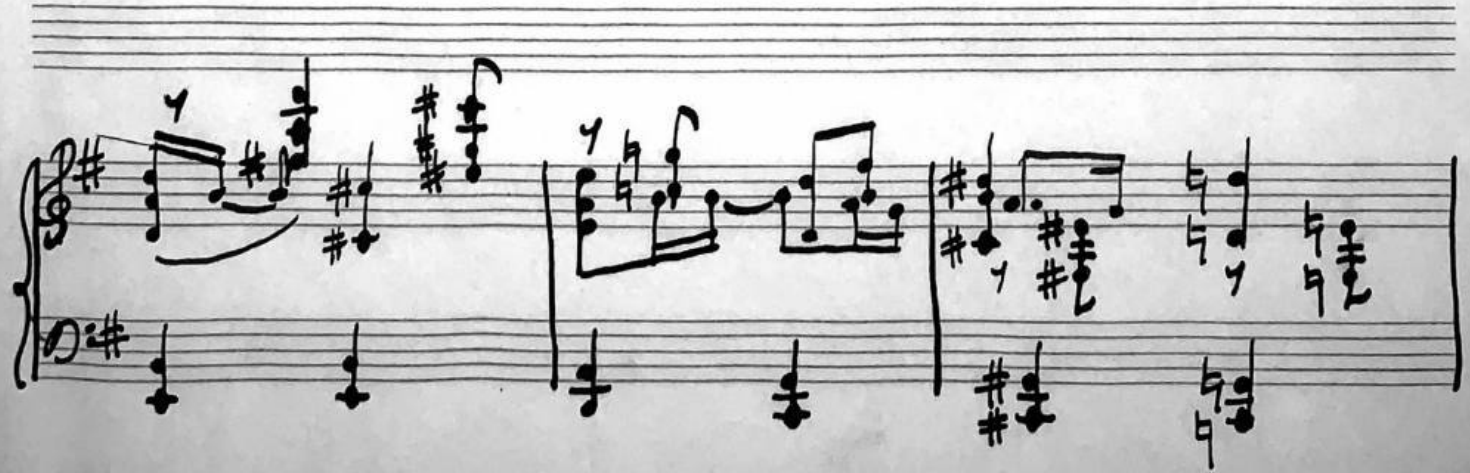


"Kepler: 'The reality of the world consists of its mathematical relations...'"

l.h.



"Descartes: 'Give me extension and motion and I will construct the universe...'"



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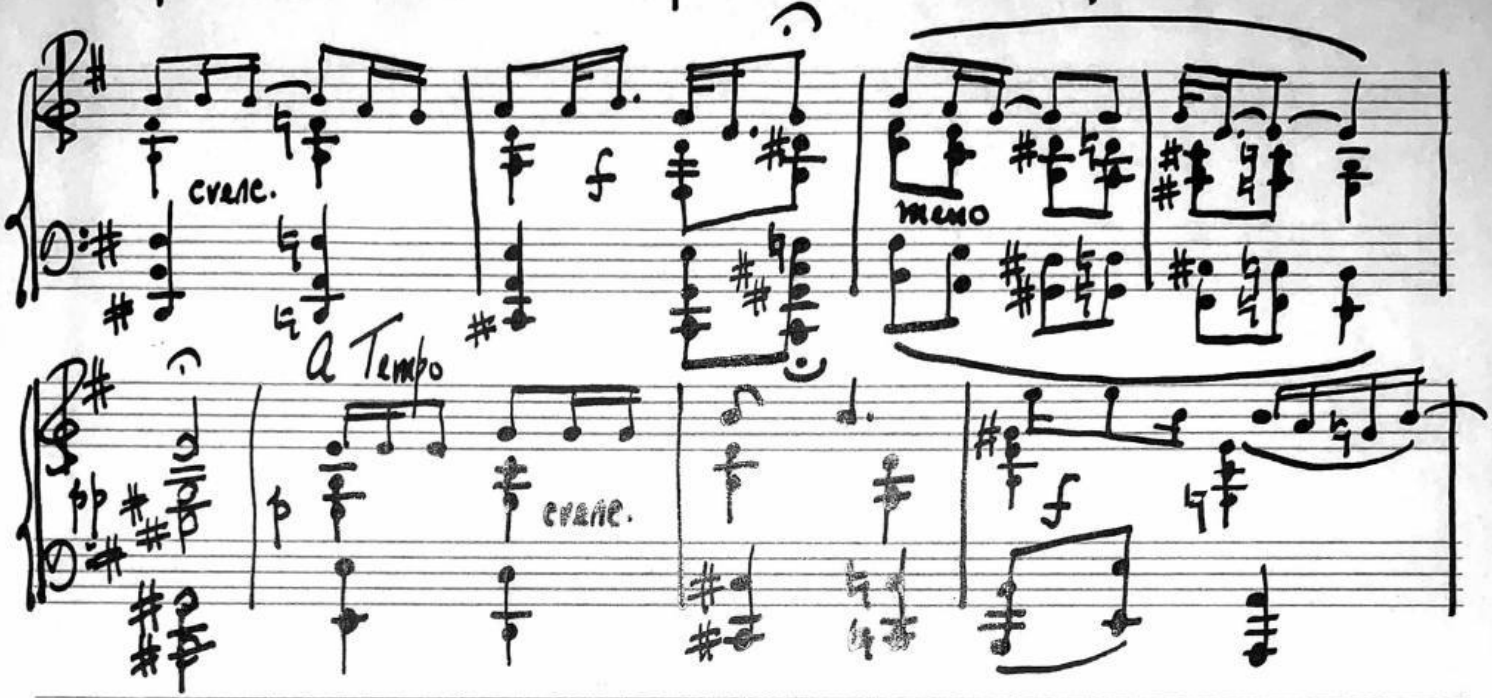
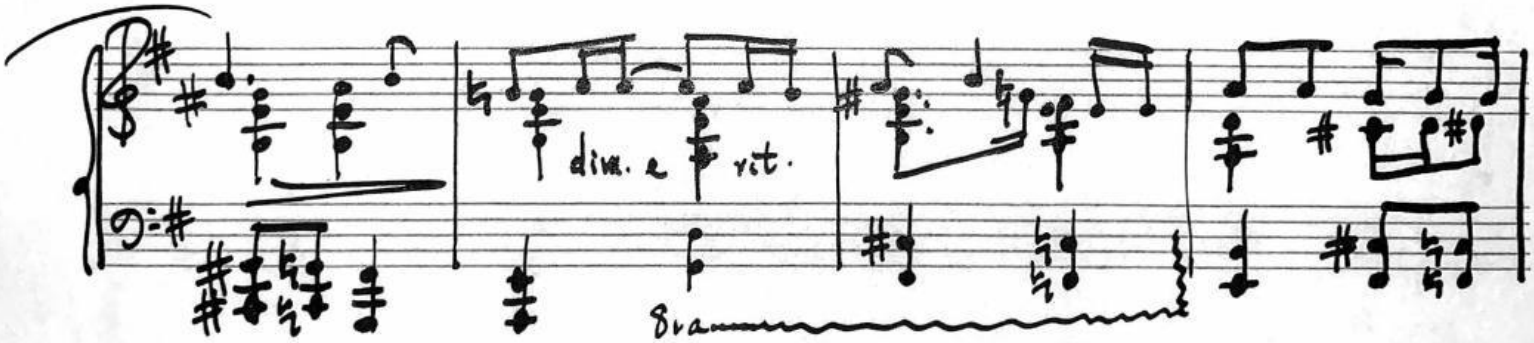
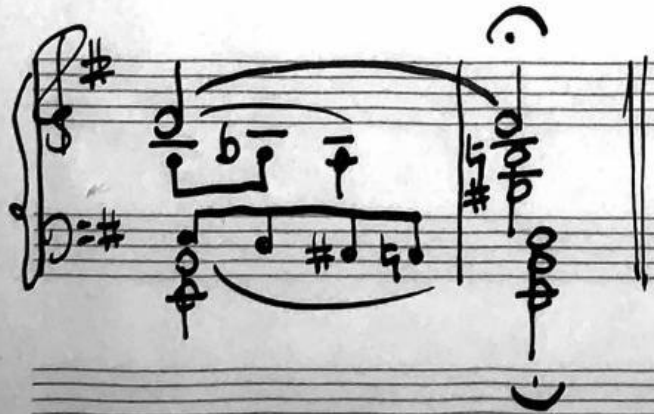
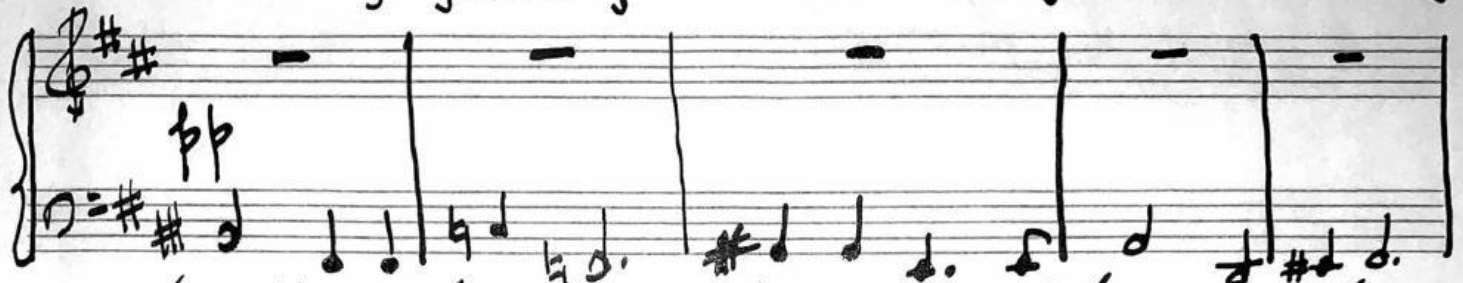
"Copernicus: "Nature is pleased with simplicity..."



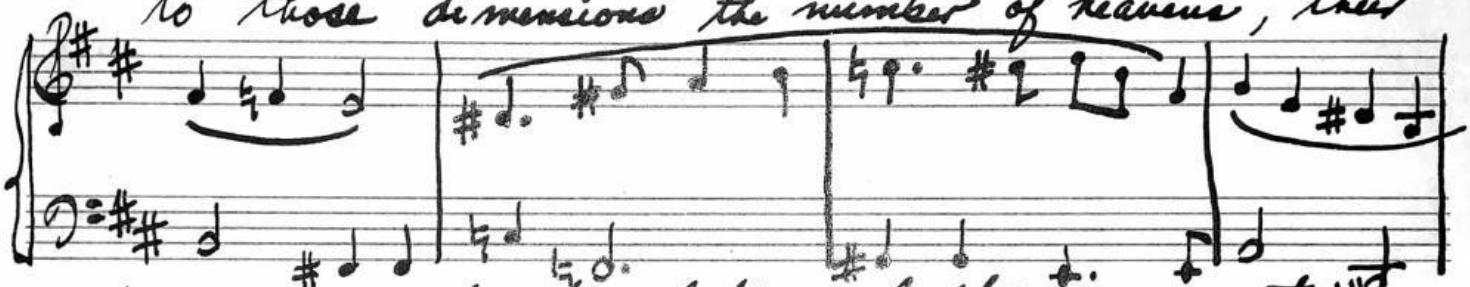




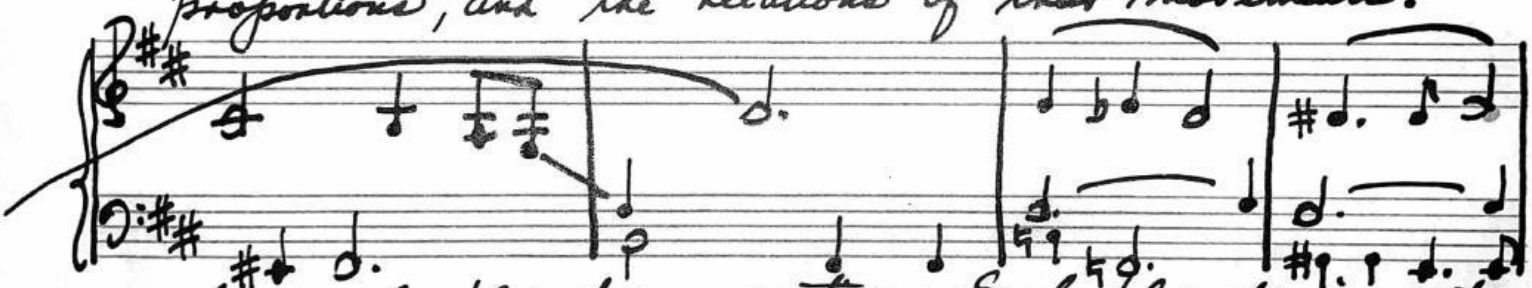
"Kepler: ... God had in view the five regular bodies of geometry ... and he has fixed according



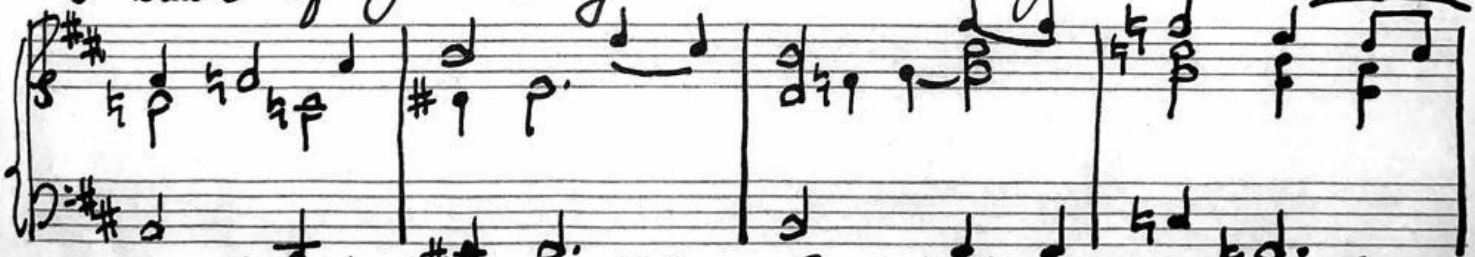
to those dimensions the number of heavens, their



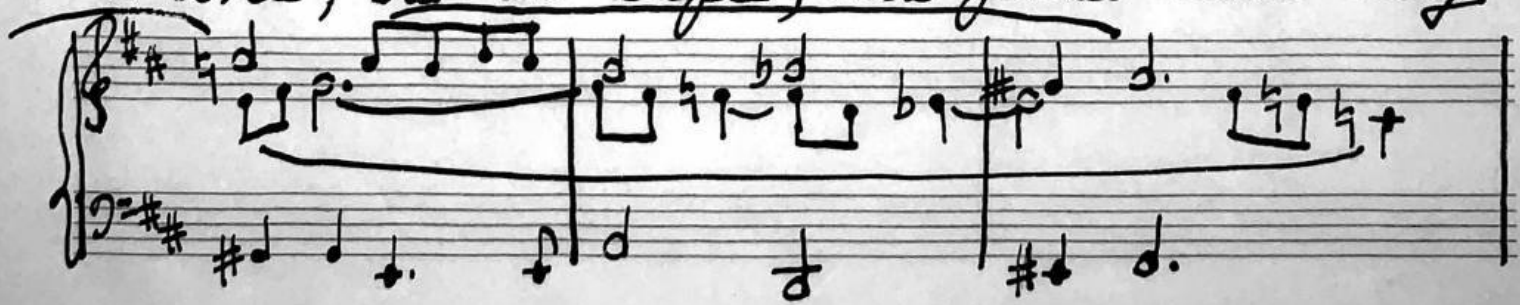
proportions, and the relations of their movements."



3 laws of planetary motion: Each planet is not



a circle, but an ellipse; Each planet moves along



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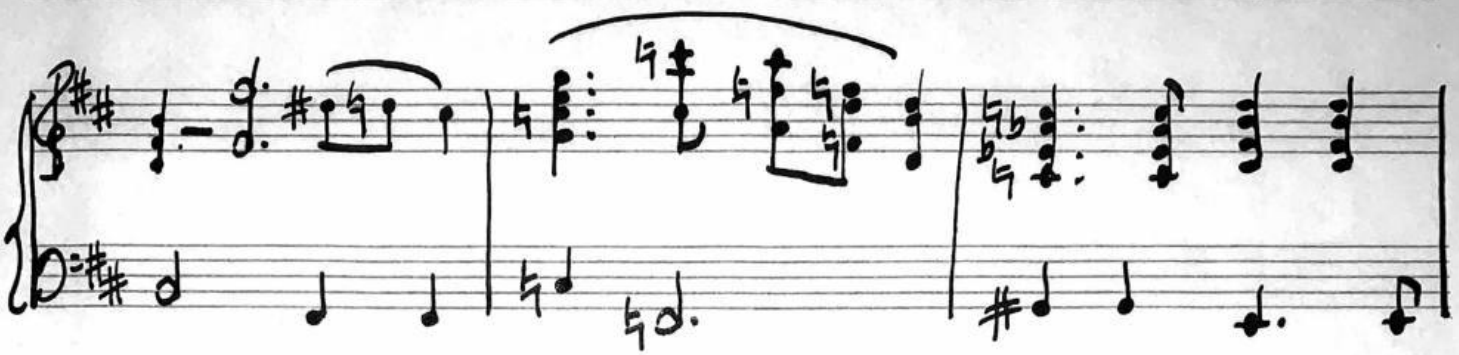
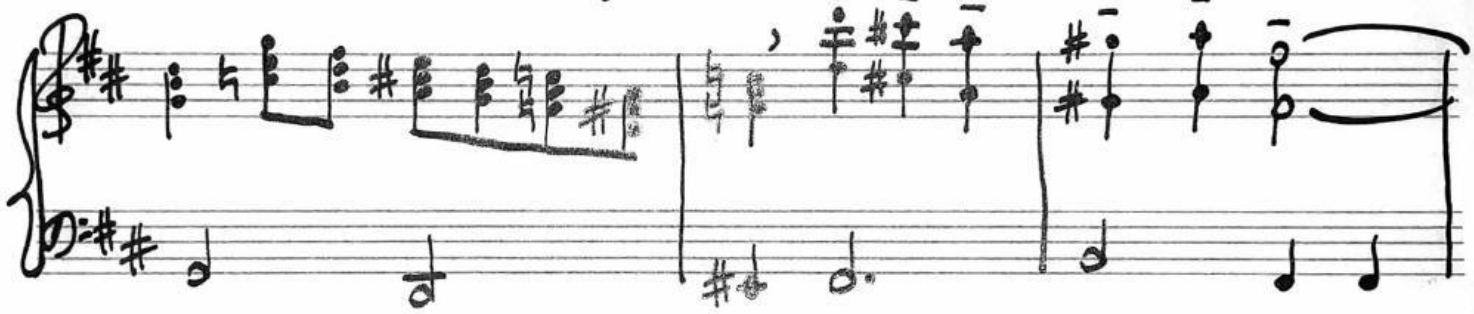
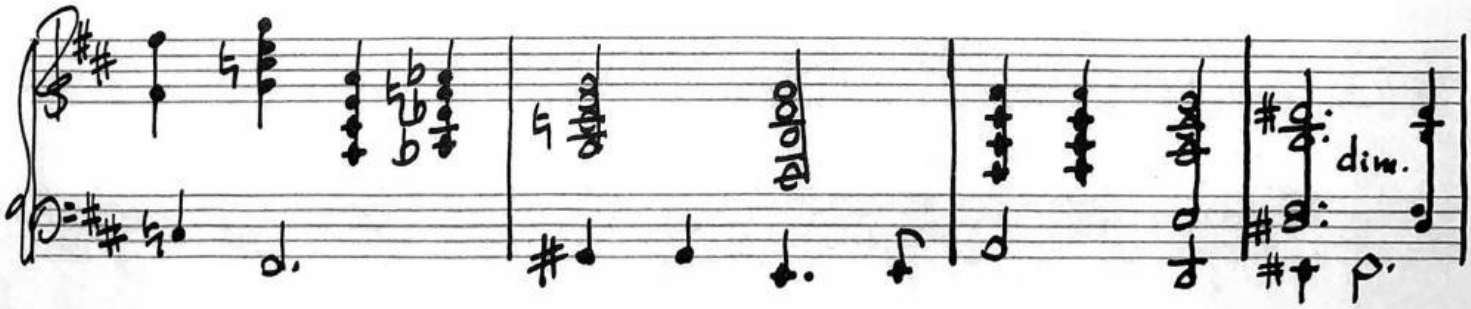
its ellipse at a constant speed; the square of the



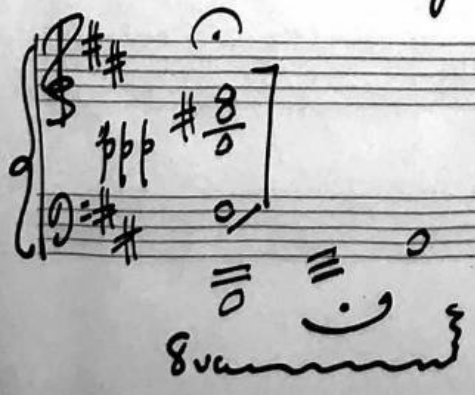
time of revolution of any planet is proportional to

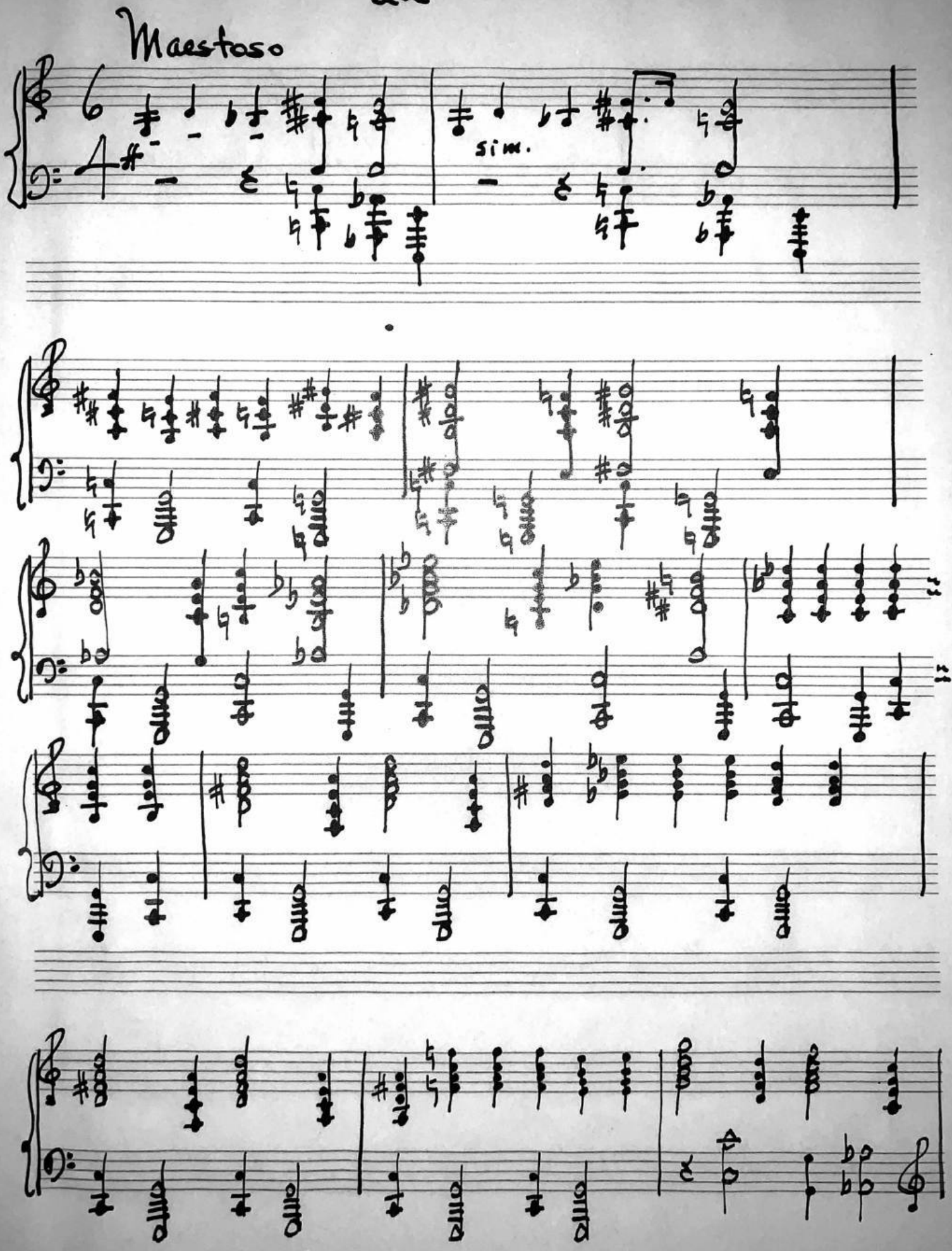


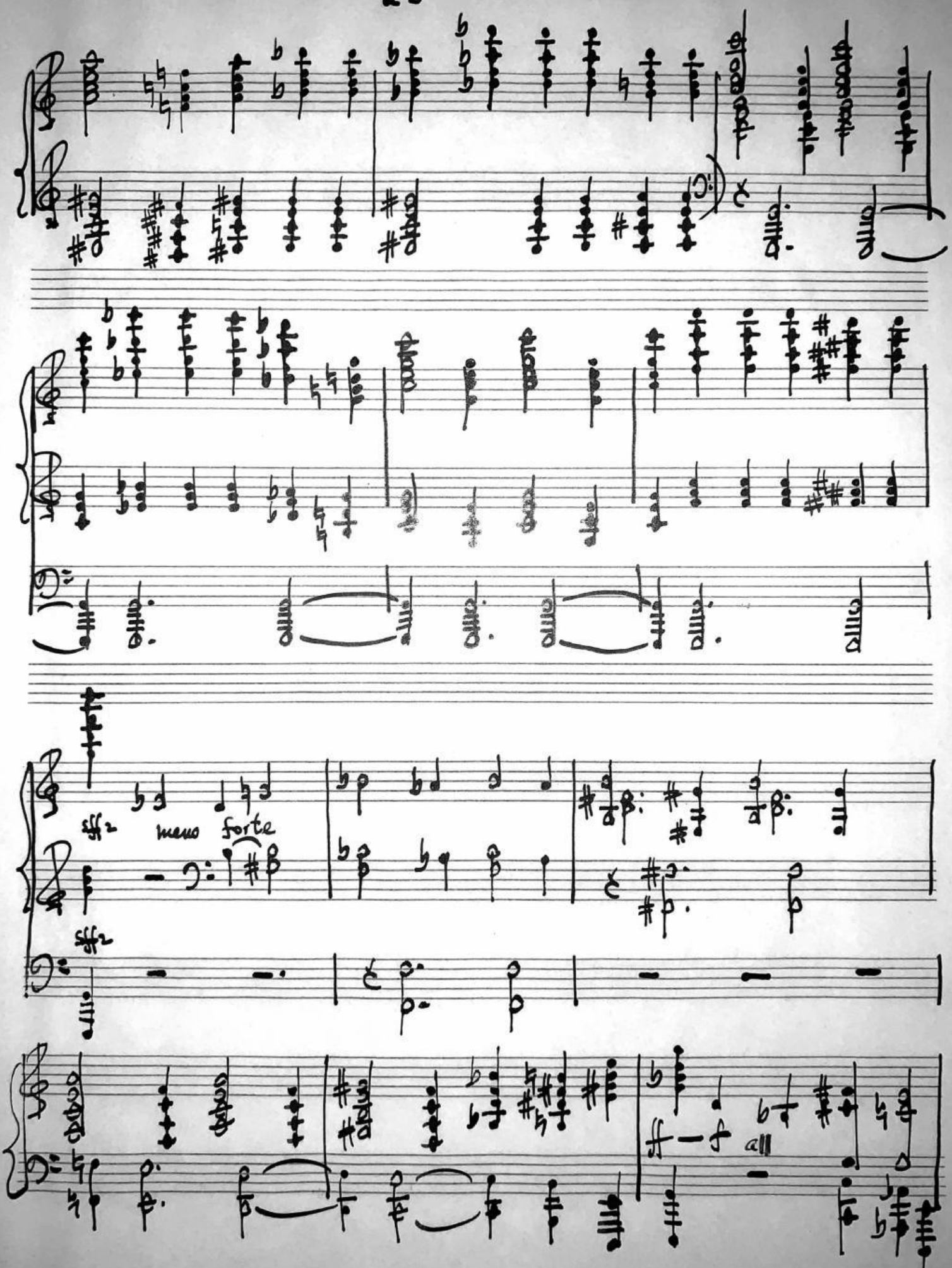
the cube of its average distance from the sun."



"Copernicus: . . . under this orderly arrangement, a wonderful symmetry in the universe, and a definite relation of harmony in the motion and magnitude of the orbs . . . "




Maestoso
sim.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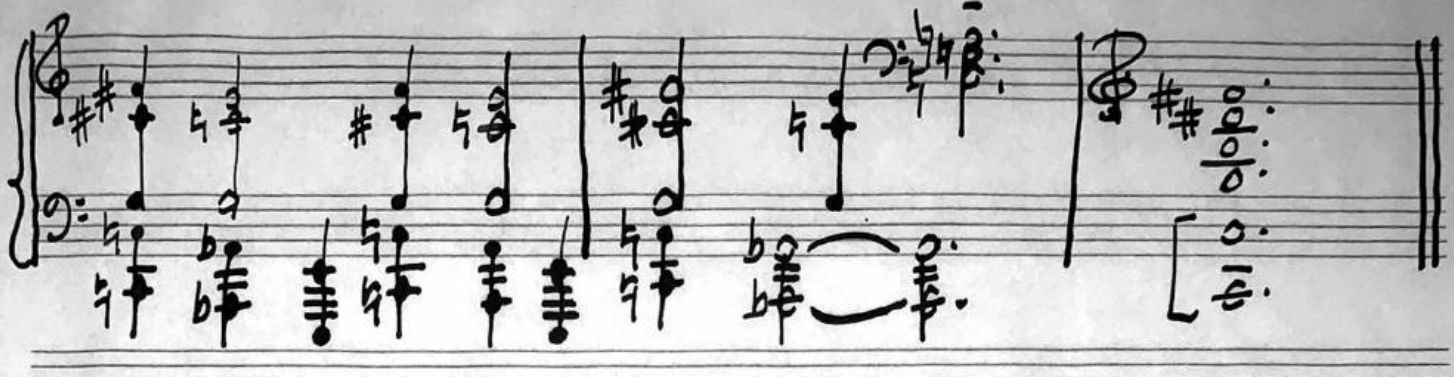
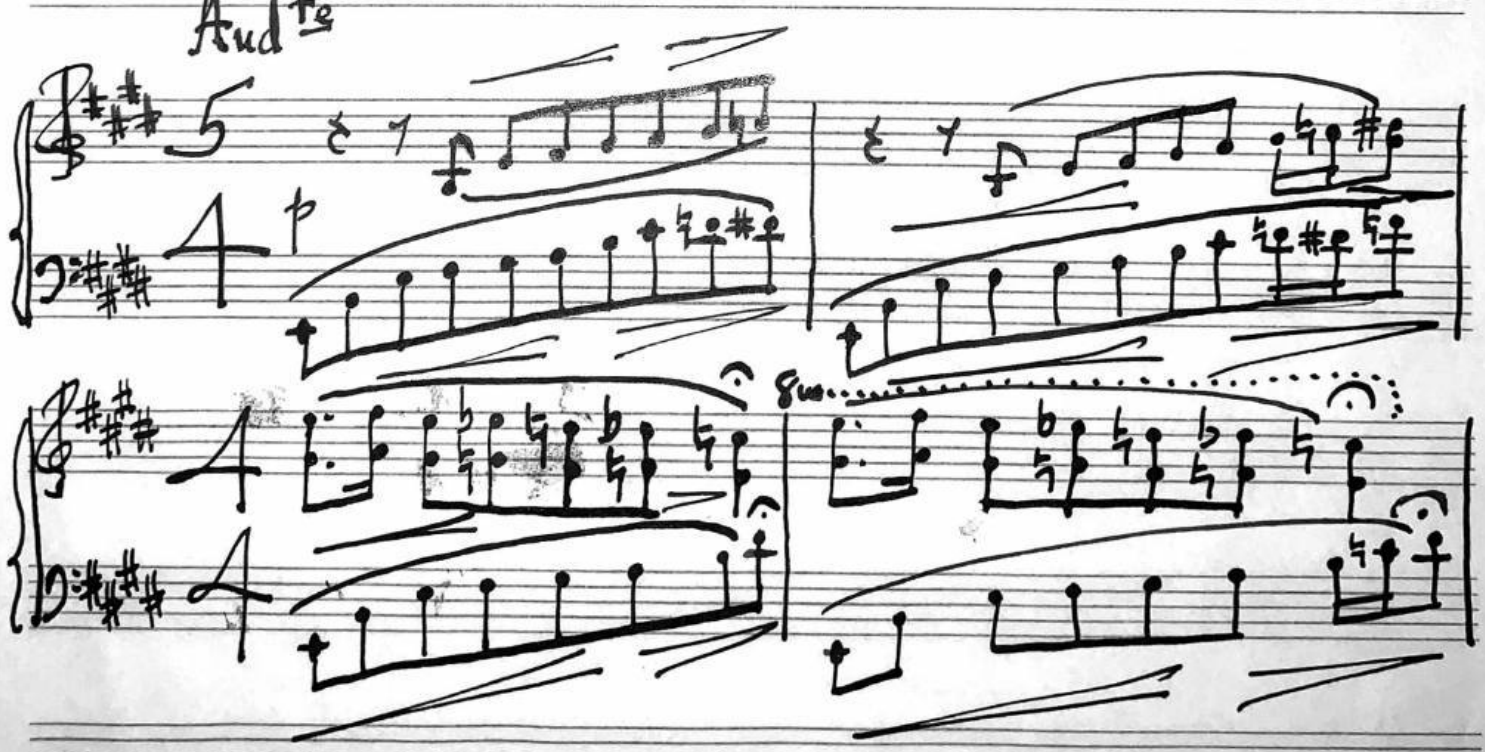
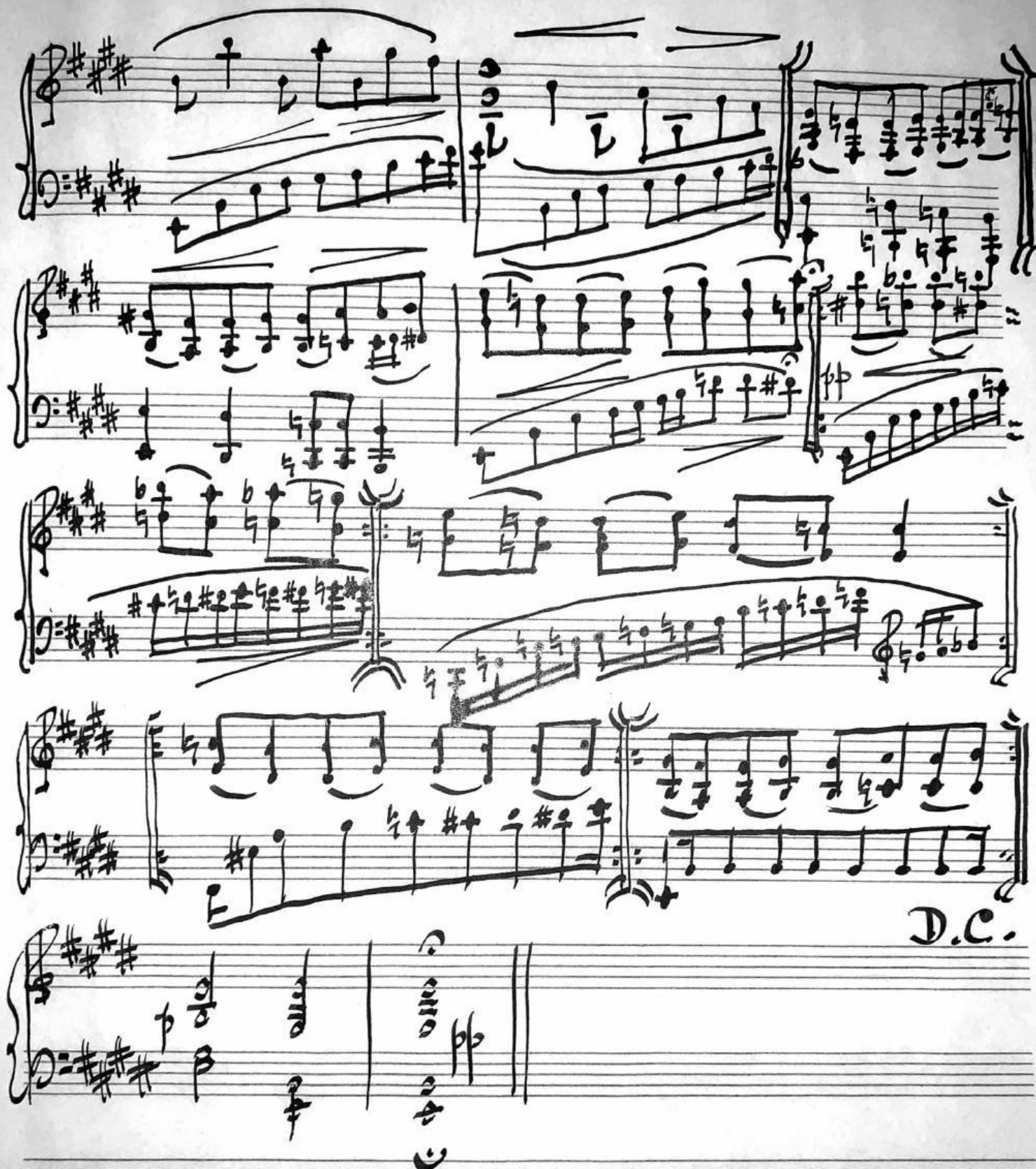


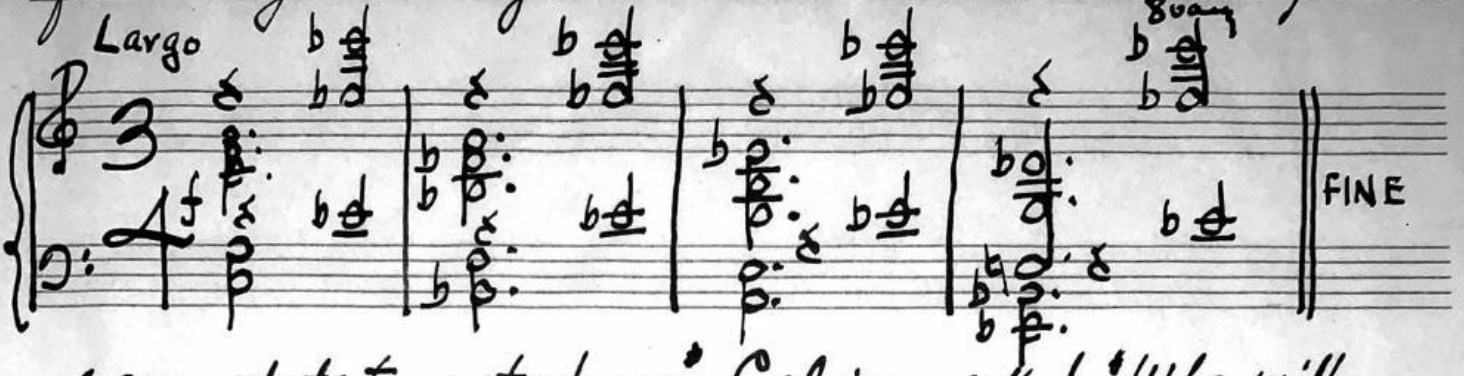
"Copernicus – Kepler – Galileo with their scientific arguments repudiated religious thinking as the answer to mankind's problems.

Why does man live?
For what purposes does man live?
Why preserve the race?"

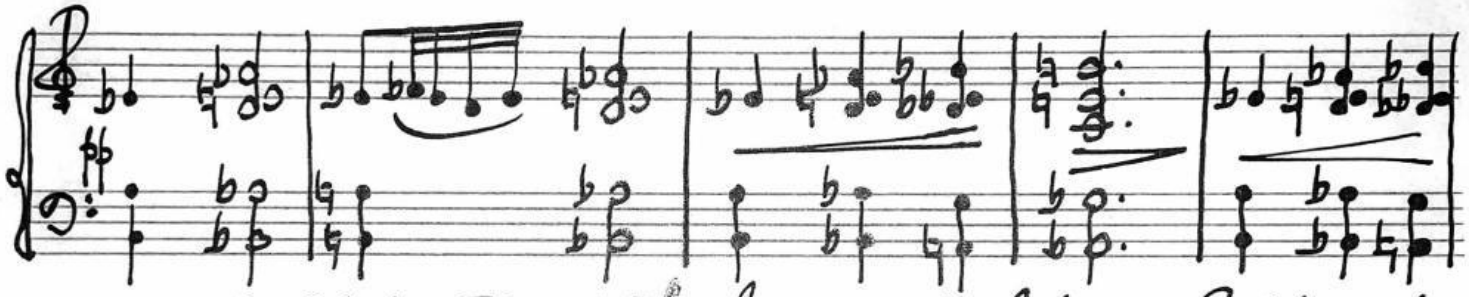



D.C.

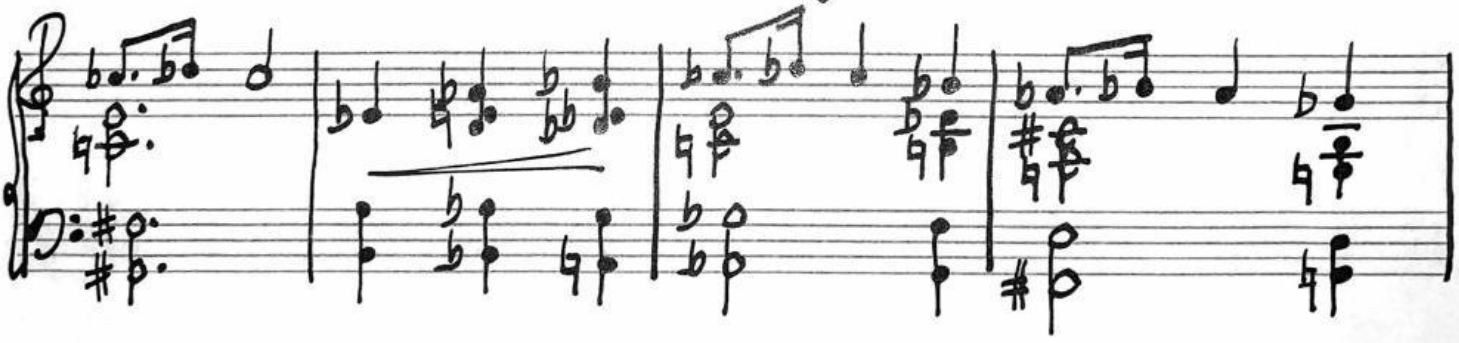
"Mathematics is the scientific Declaration of Independence from religious dogma. Martin Luther called Copernicus

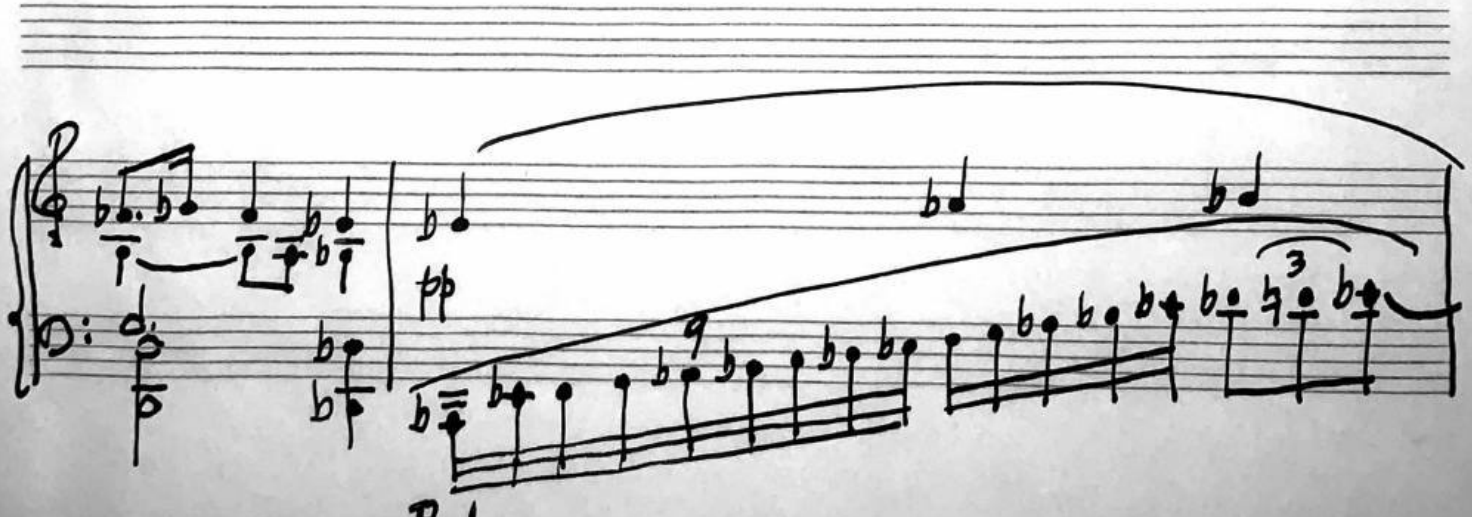


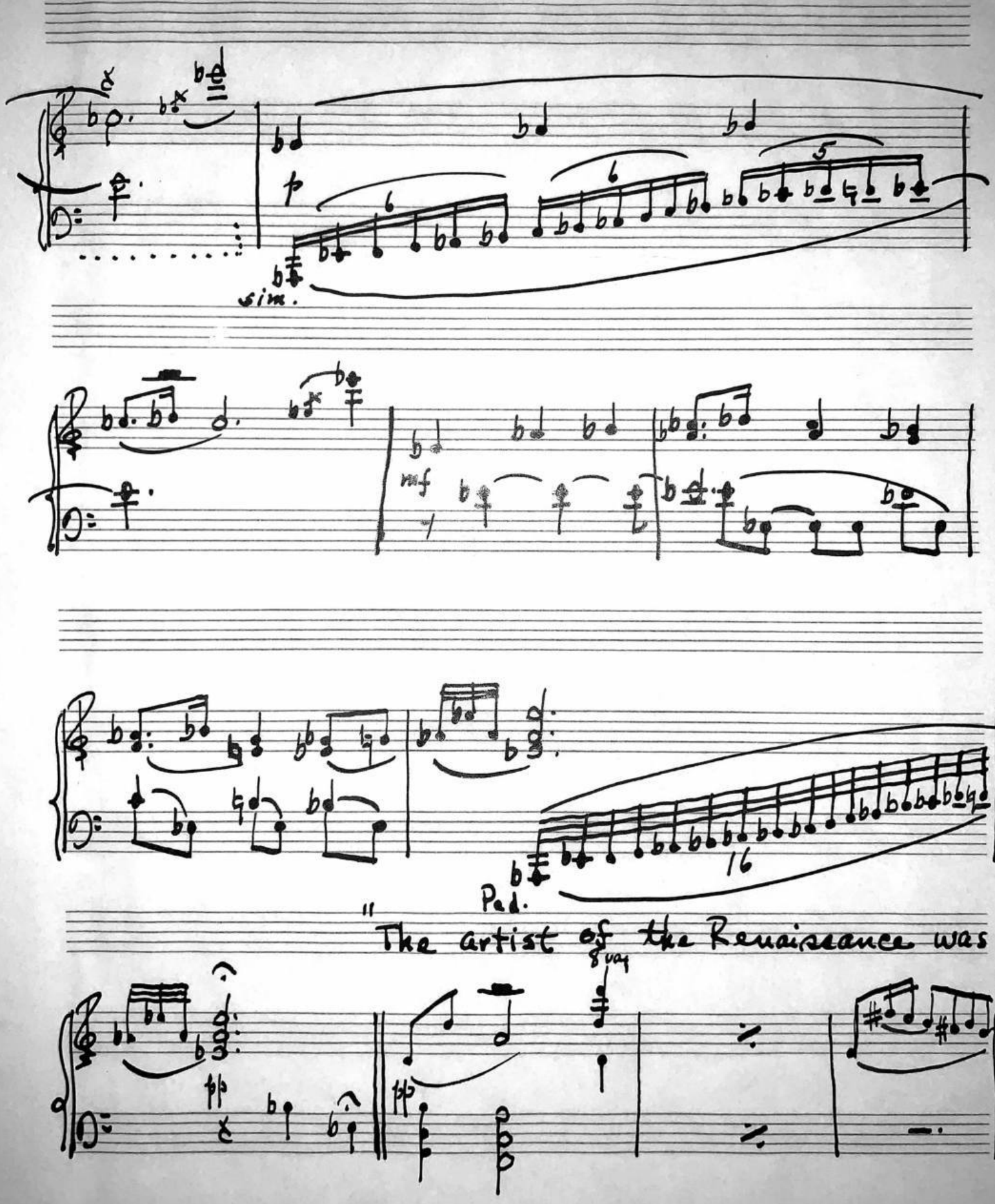
'an upstart astrologer.' Calvin asked 'Who will venture to place the authority of Copernicus above that



of The Holy Spirit?' In 1616 the Index of Prohibited Books banned publications dealing with Copernicanism."







NO. D -LL - 12 STAVE
KING BRAND
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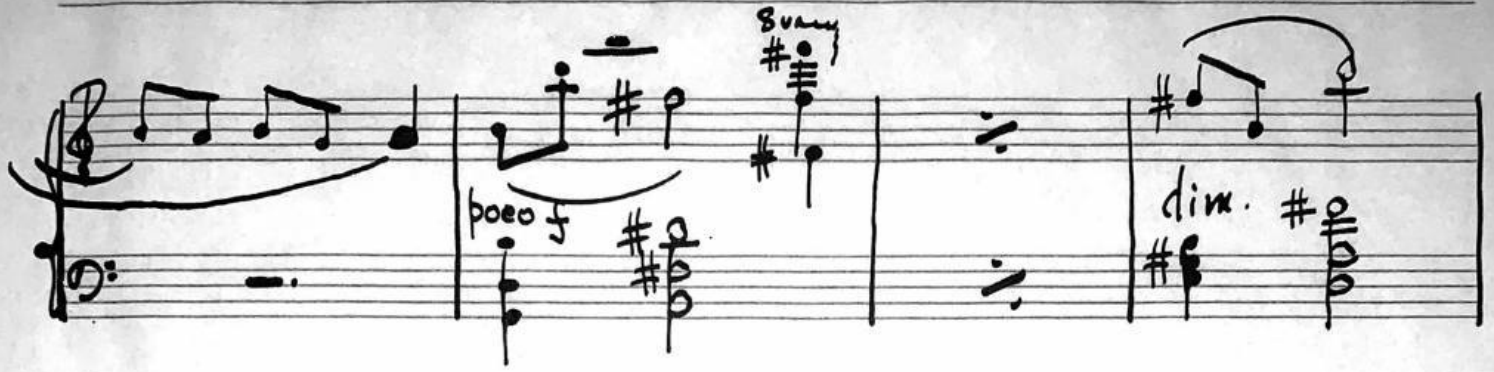
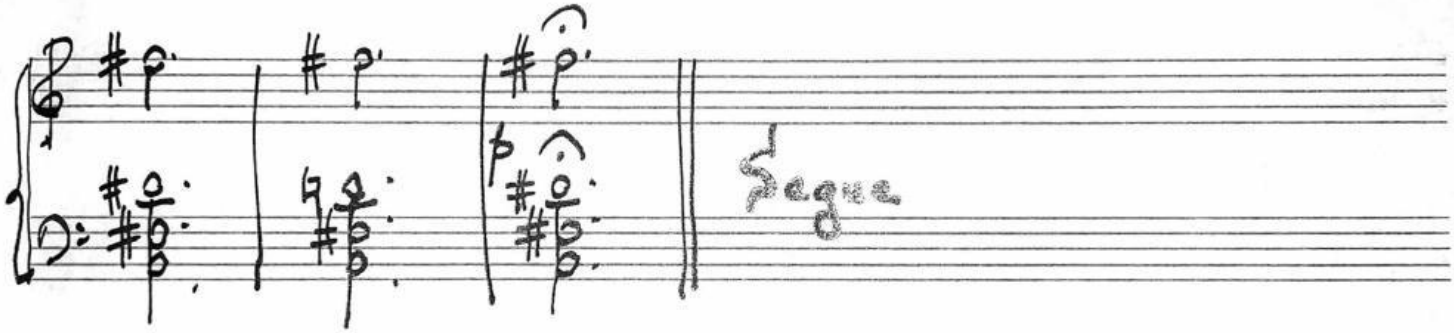
a scientist and mathematician. Leonardo da

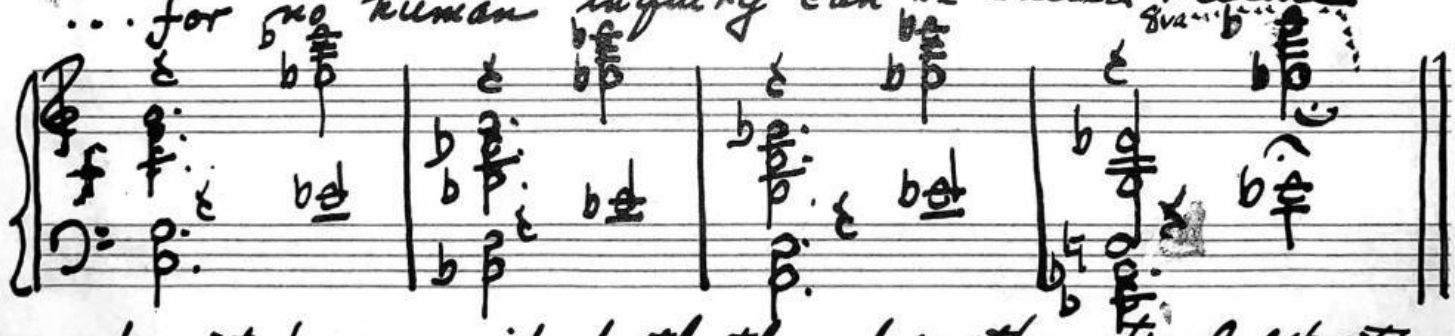


Vinci in his Trattato della Pittura said: "Let no

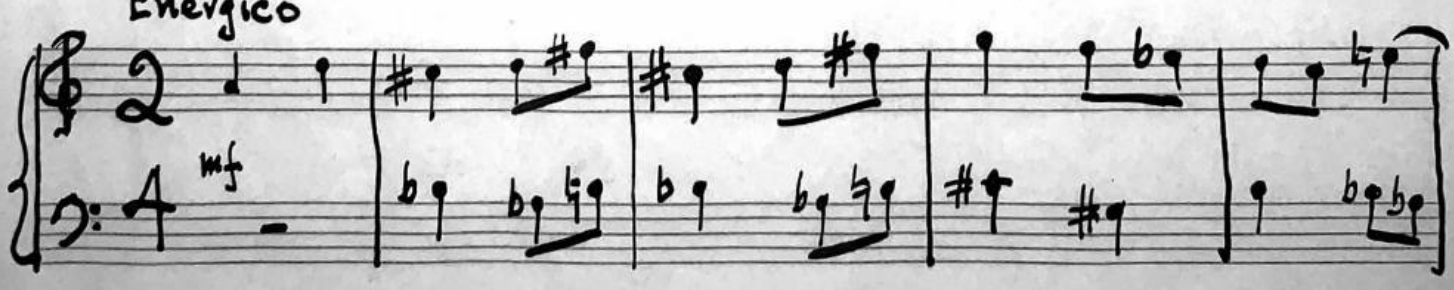


one who is not a mathematician read my works."

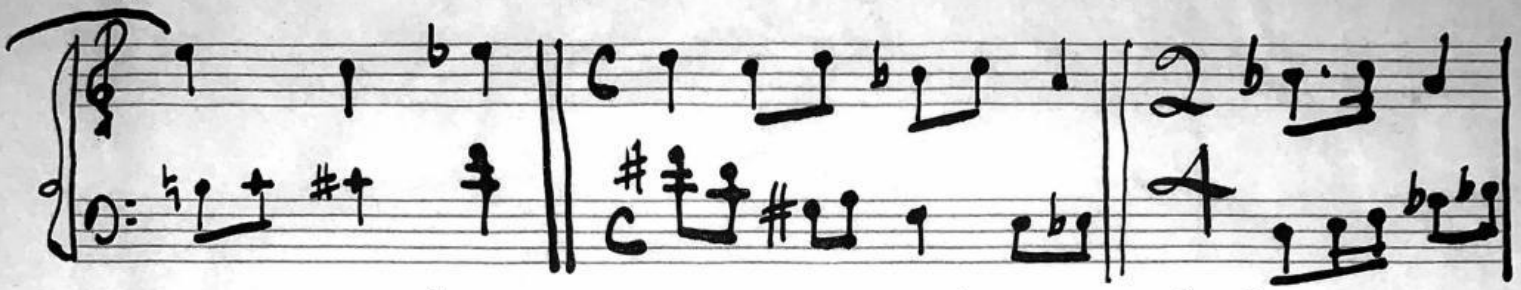
"... for no human inquiry can be called science



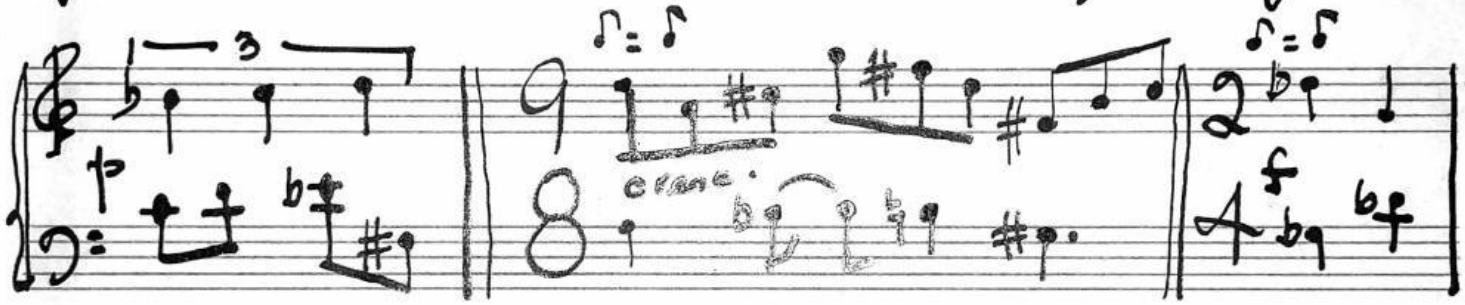
unless it pursues its path through mathematical exposition

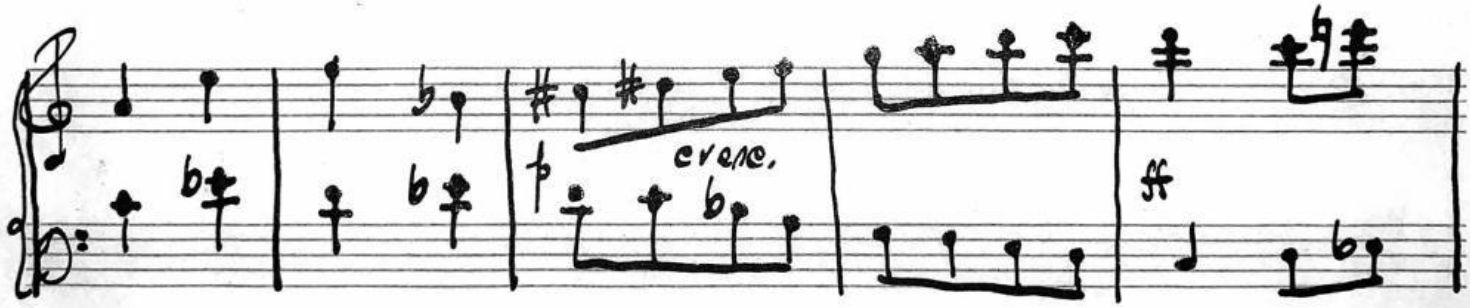


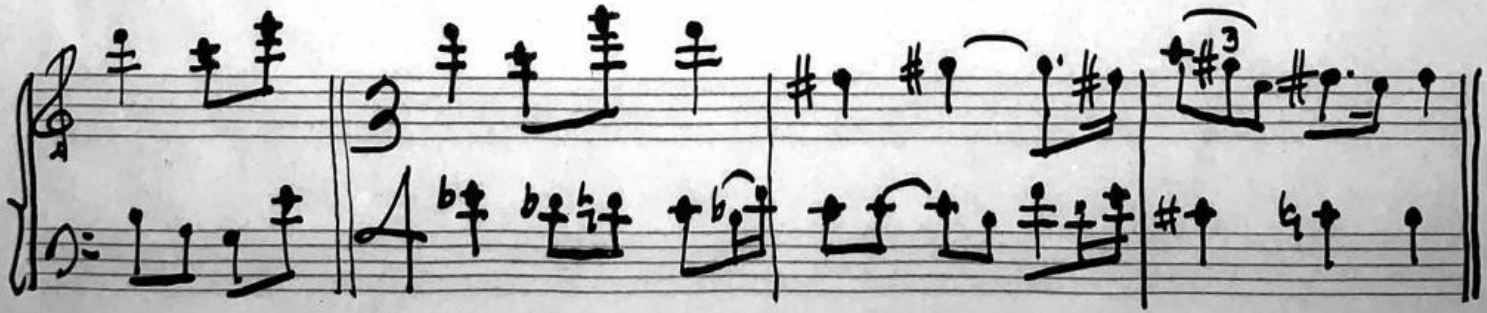
and demonstration... The man who discredits the supreme certainty of mathematics is feeding on

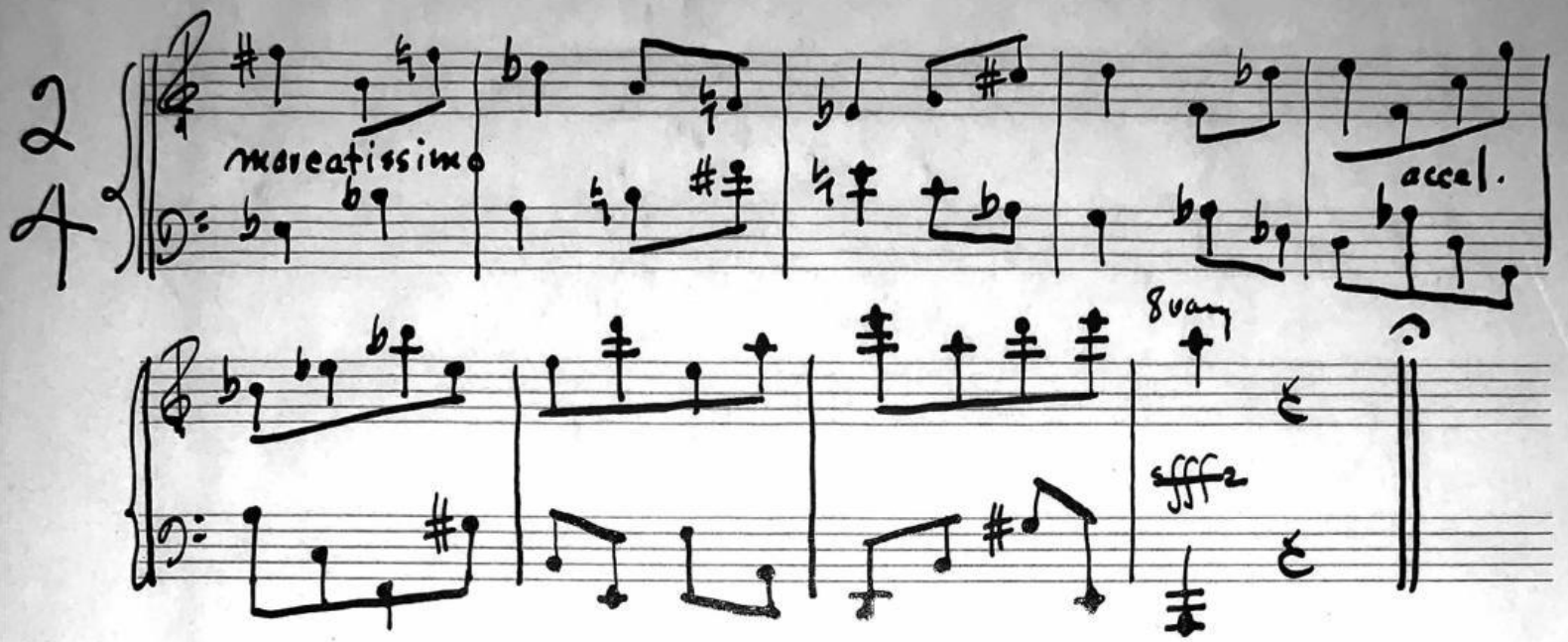


confusion, and can never silence the contradictions of sophistical sciences, which lead to eternal quackery."

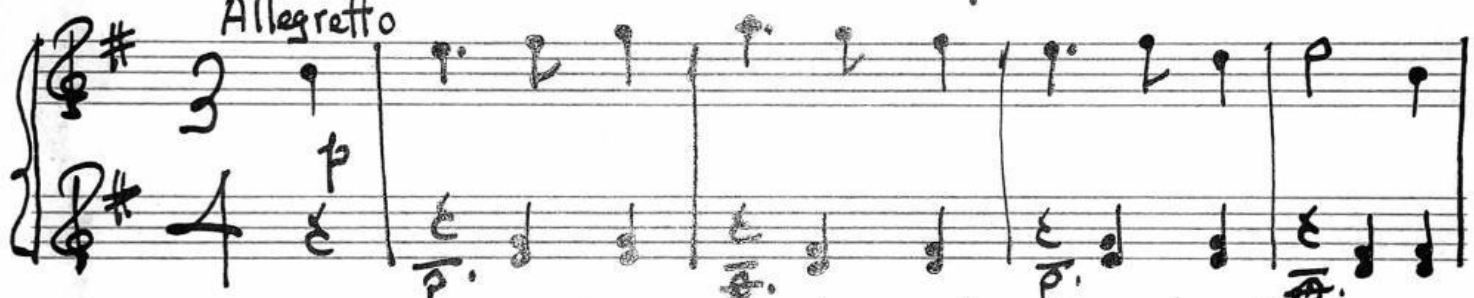




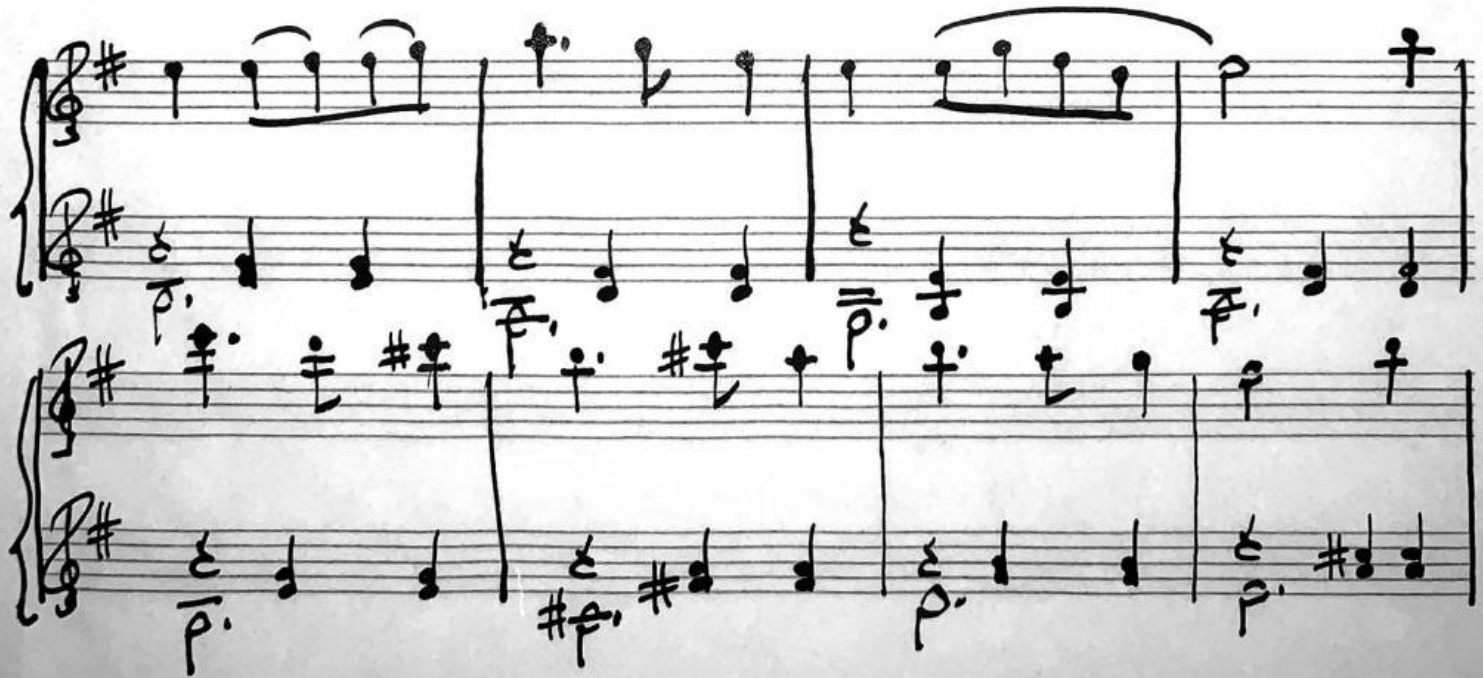




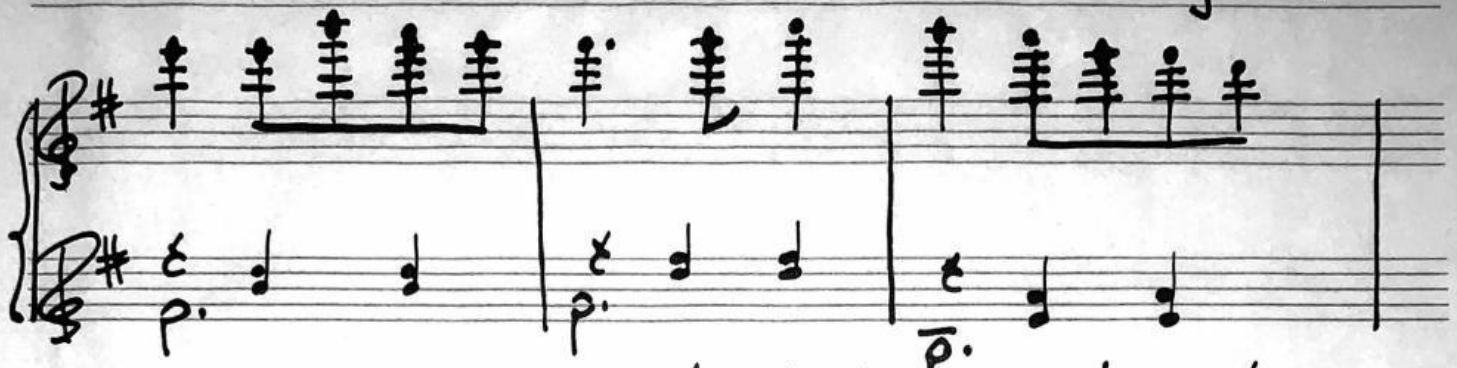
"De Morgan said that 'The moving power of mathematical



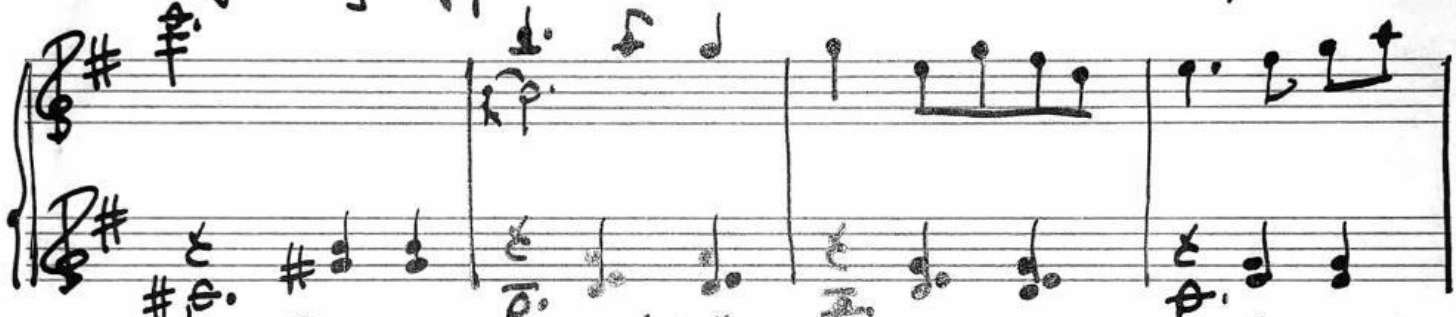
invention is not reasoning but imagination.'"



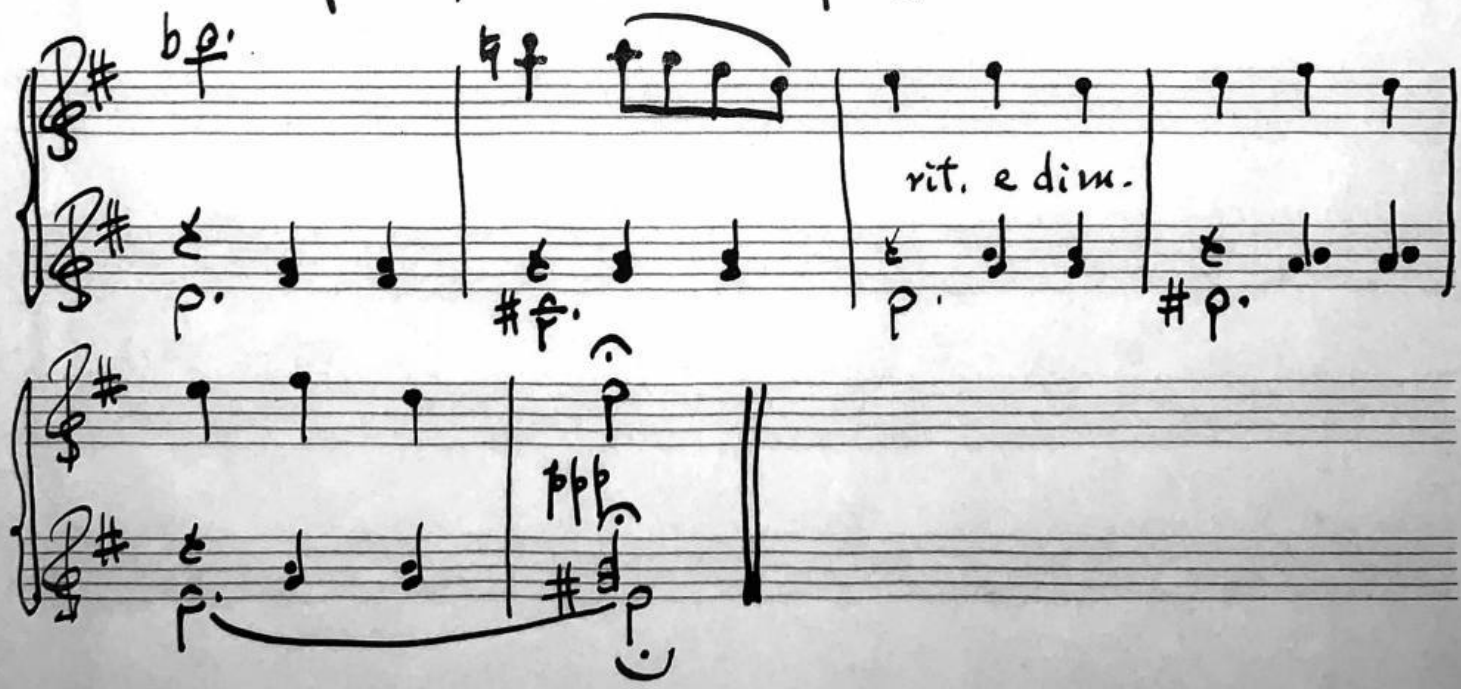
Let us listen to Brianchon's theorem: "If a



hexagon is circumscribed about a circle the lines joining opposite vertices meet in one point."



And La Grange averred: "When these sciences (algebra and geometry) joined company, they drew from each other fresh vitality and thenceforward marched on at a rapid pace toward perfection."

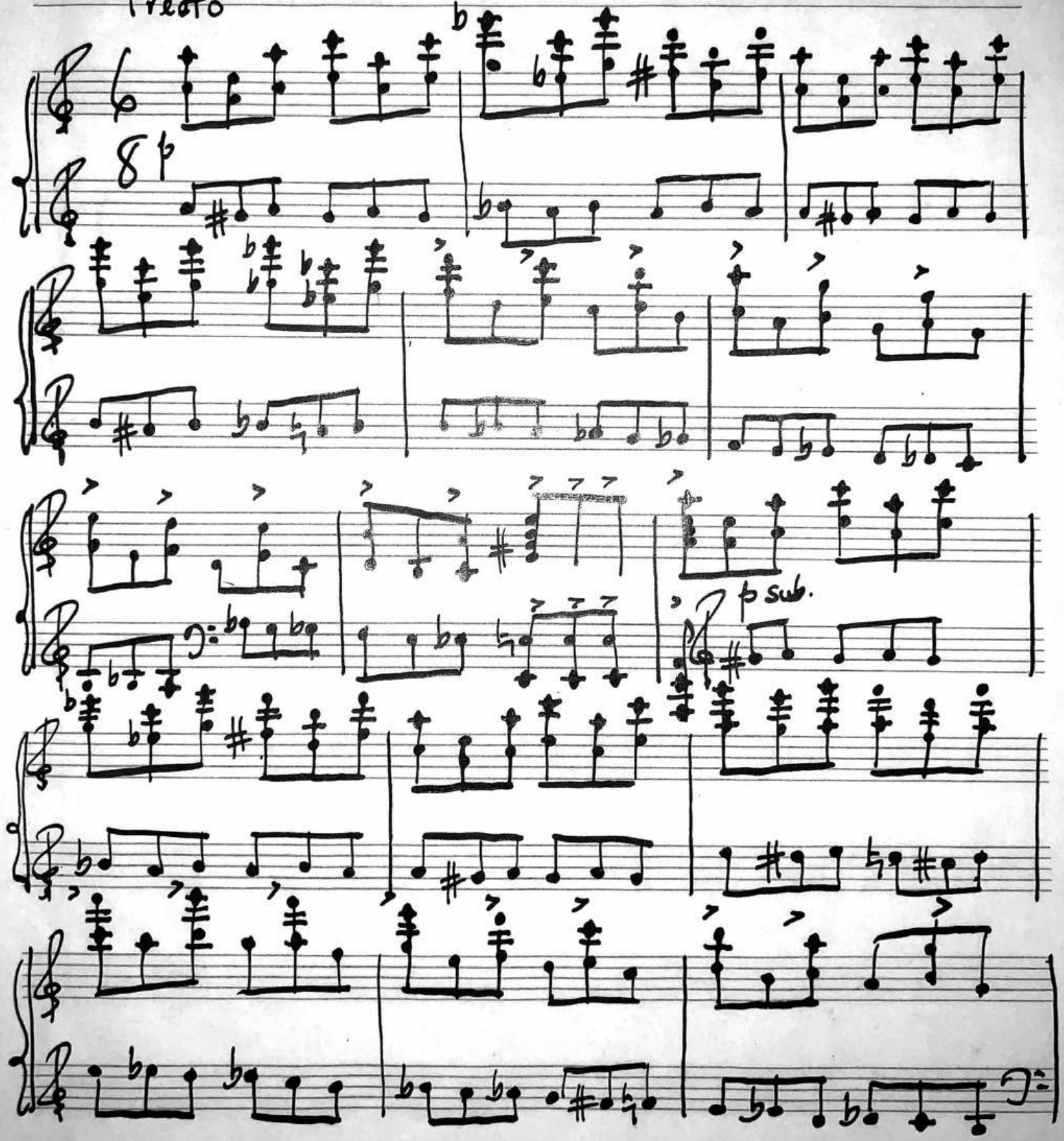


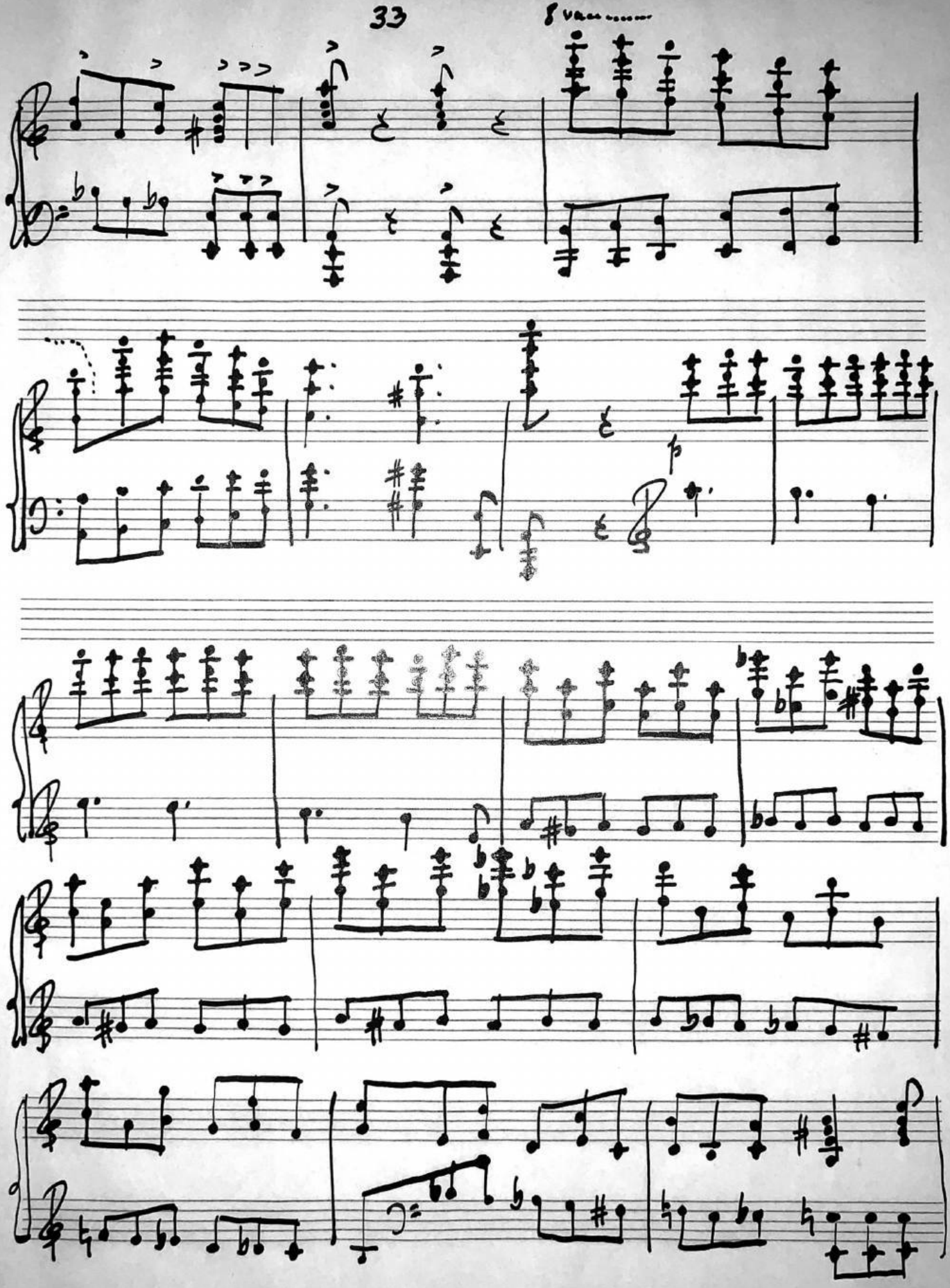
NO. D -LL · 12 STAVE

KING BRAND
1595 B'WAY, N. Y.

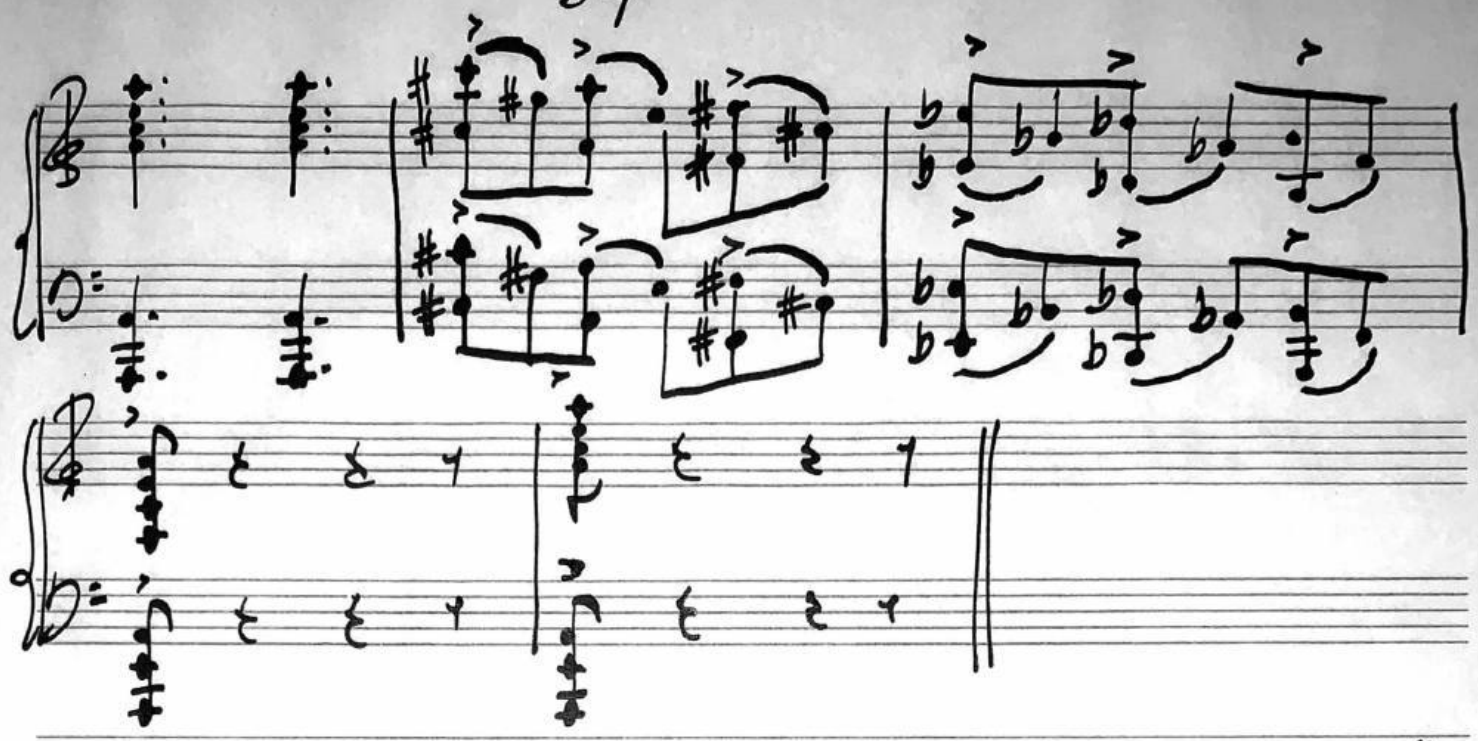
"Ellipses! Parabolas! Hyperbolas! — describing paths of comets and planets - - - "

Presto



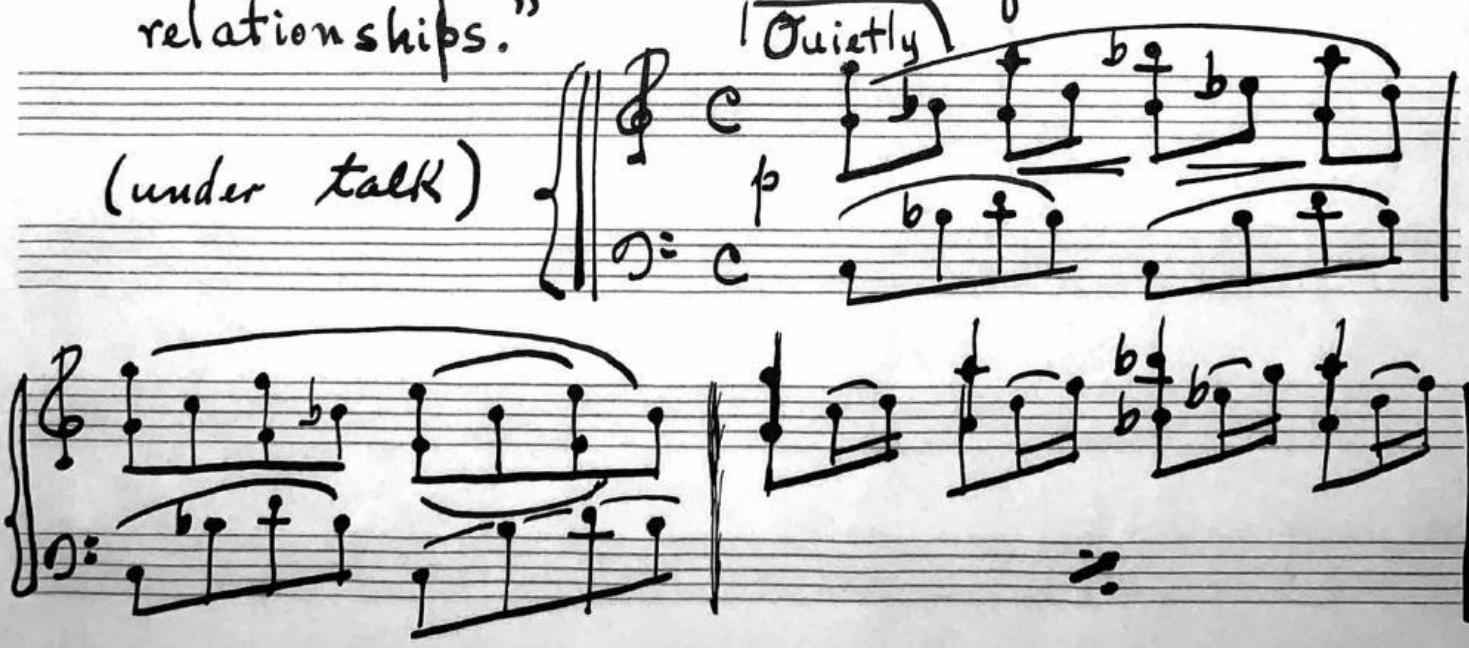


KING BRAND
1595 B'WAY, N. Y.

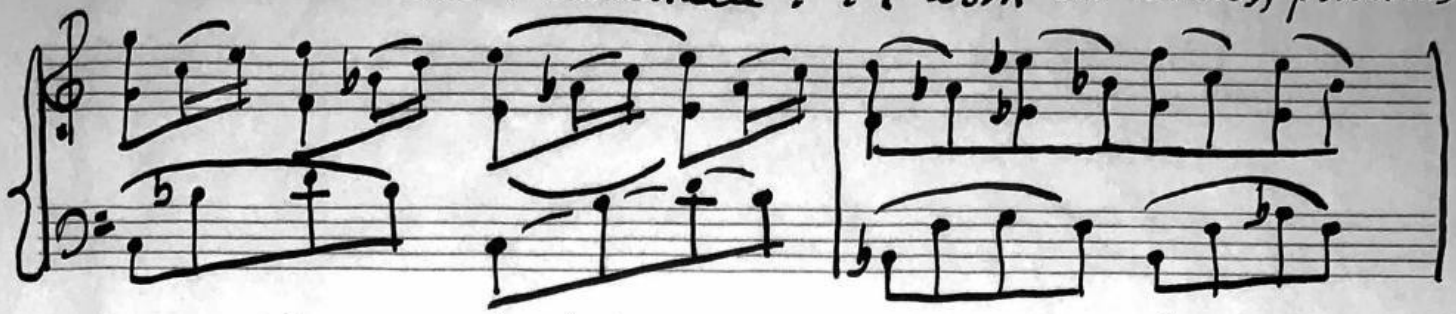


Morris Kline: "How does man come to know truth?"
"How does man obtain knowledge?"
"The history of modern science is the history of the gradual elimination of gods and demons and the reduction of vague notions about light, sound, forces, chemical processes, and other concepts in number and quantitative relationships."

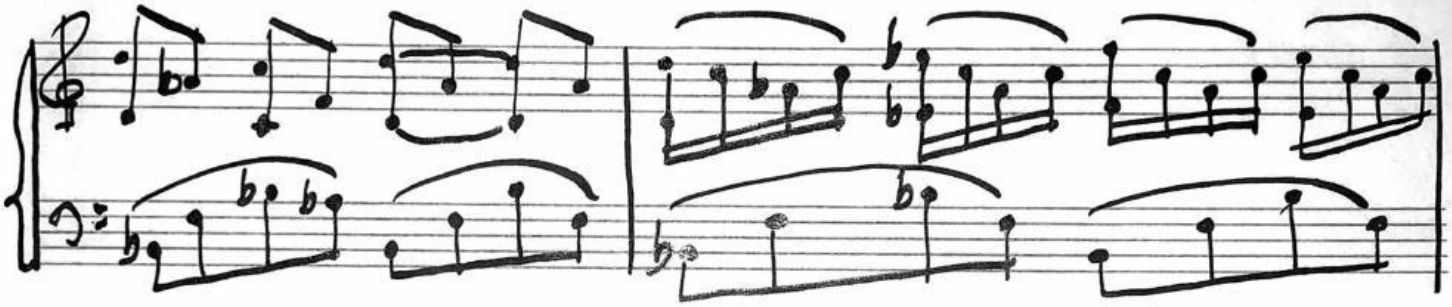
(under talk)



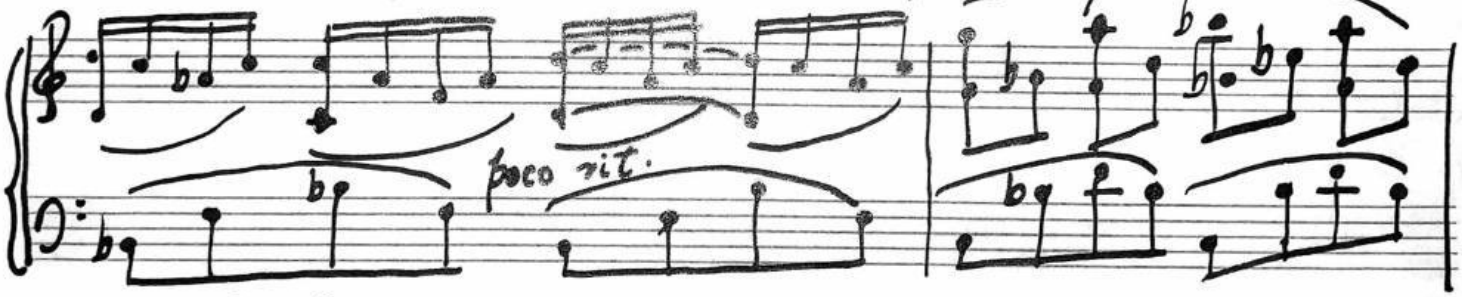
Le Bouvier de Fontenelle: "A work on ethics, politics,



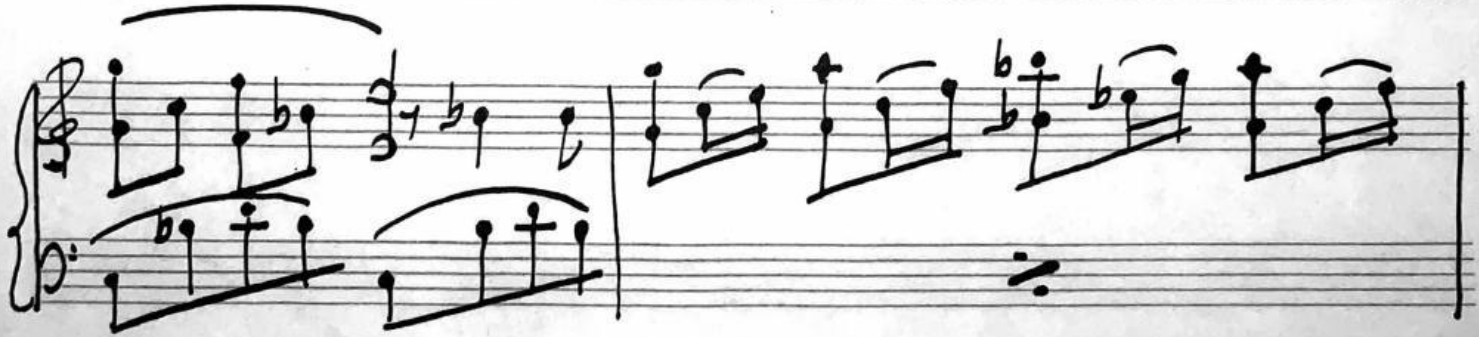
on criticism, perhaps, even a work of eloquence will be finer ... if it is done by a hand of a geometrician."



Emerson: "... if a man is at once acquainted with the geometric foundation of things and with their festal

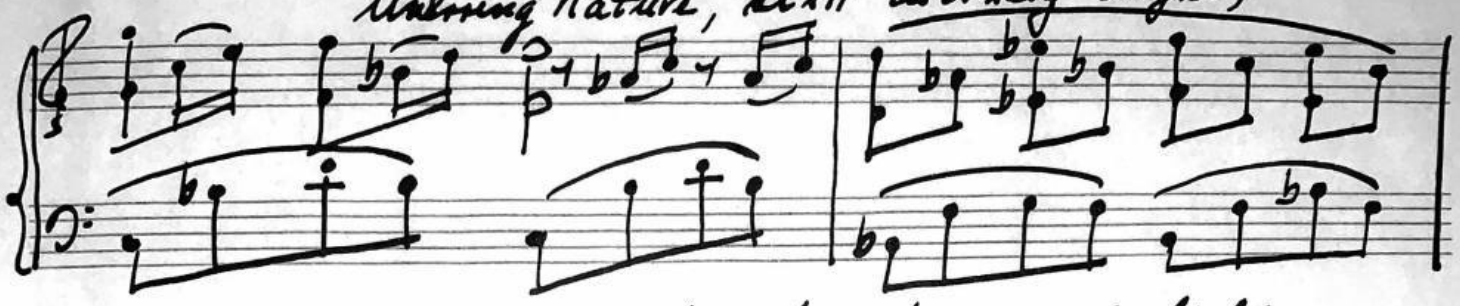


splendor, his poetry is exact and his arithmetic musical."

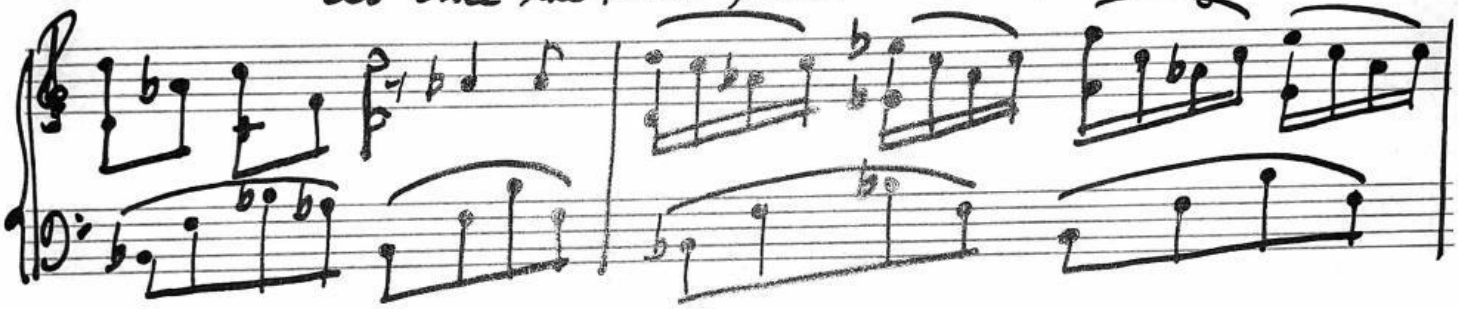


KING BRAND

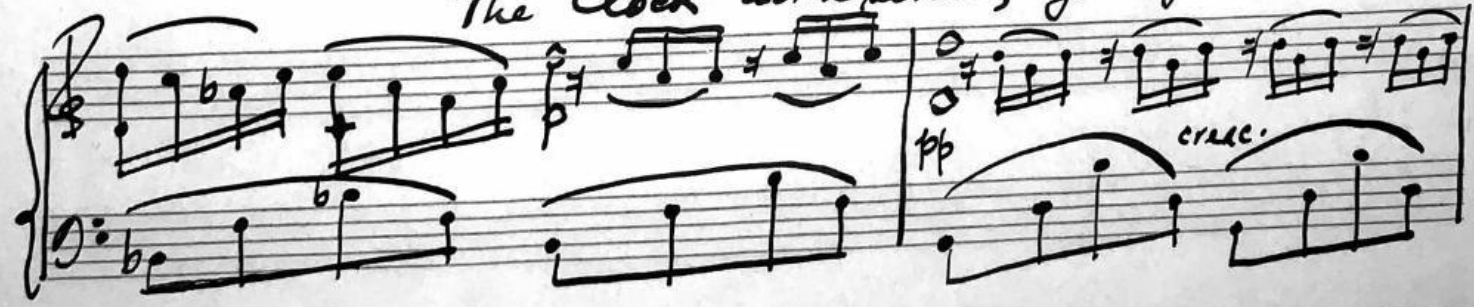
Alexander Pope: "First follow Nature and your judgment frame
By her just standard, which is still the same,
Unerring Nature, still divinely bright,



One clear, unchanged and universal light,
Life, force, and beauty, must to all impart,
At once the source, and end, and test of Art."

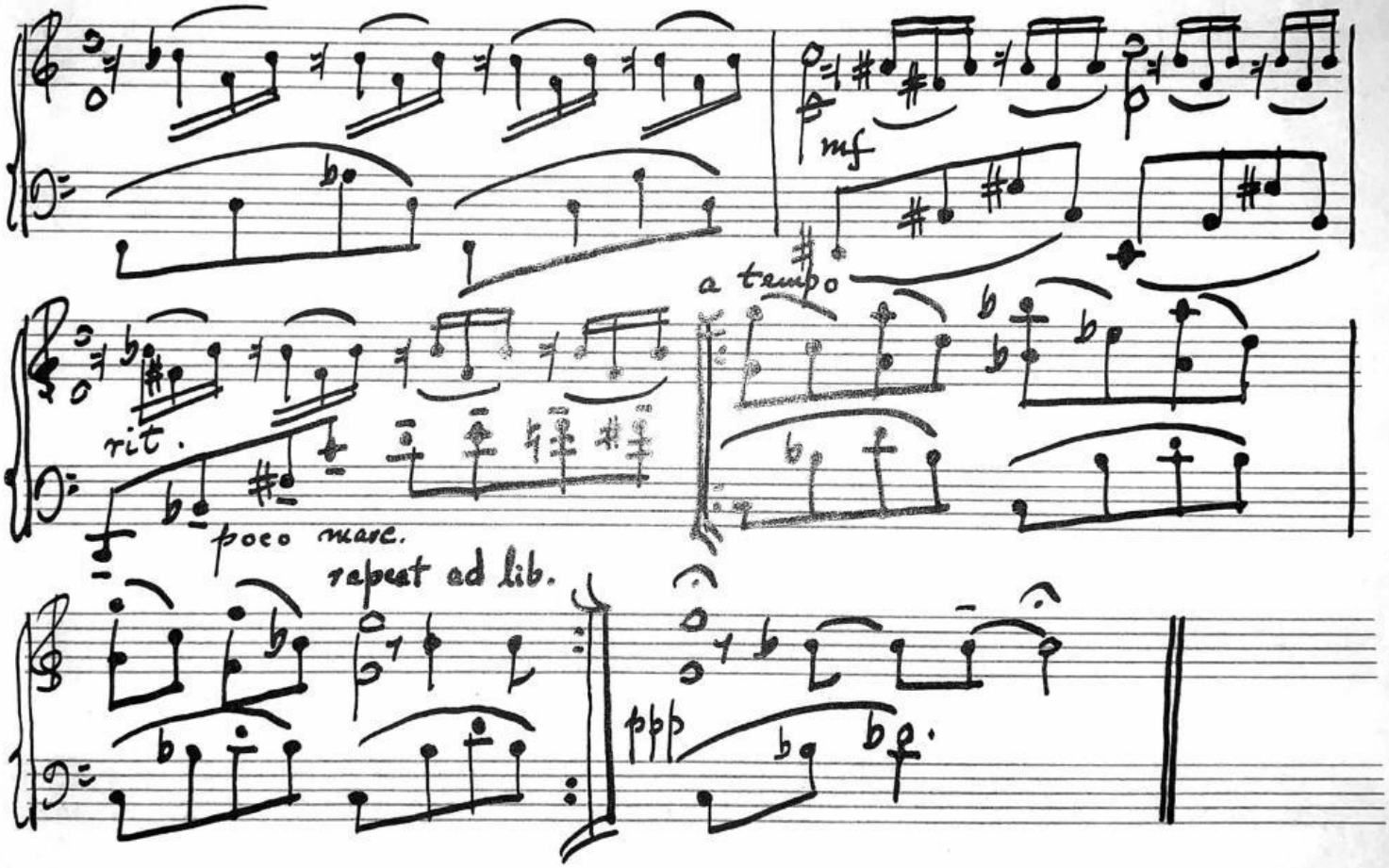


Samuel Butler: "In Mathematicks he was greater
Than Tycho Brahe, or Ezra Pater:
For he, by Geometrick scale,
Could take the sizes of Pots of Ale;
Resolve by Signs and Tangents streight,
If Bread or Butter wanted weight;
And wisely tell what hour o' the day
The Clock doth strike, by Algebra."

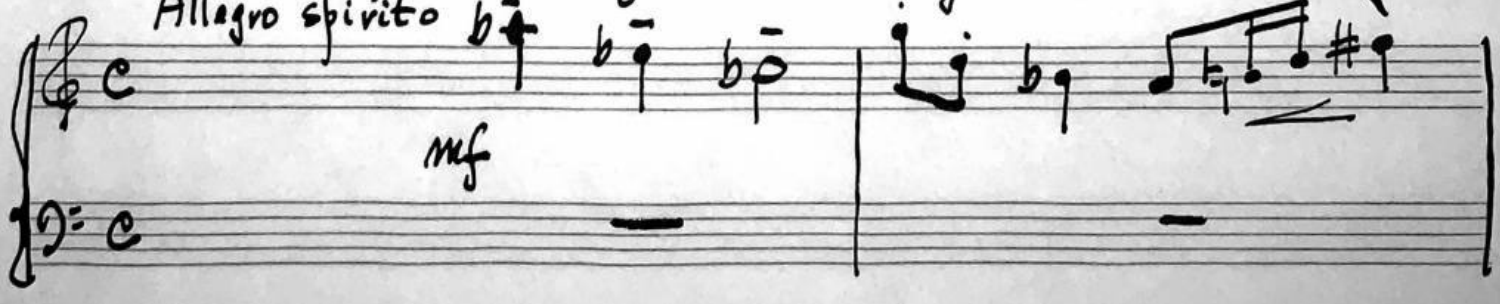


KING BRAND
1595 B'WAY, N Y.

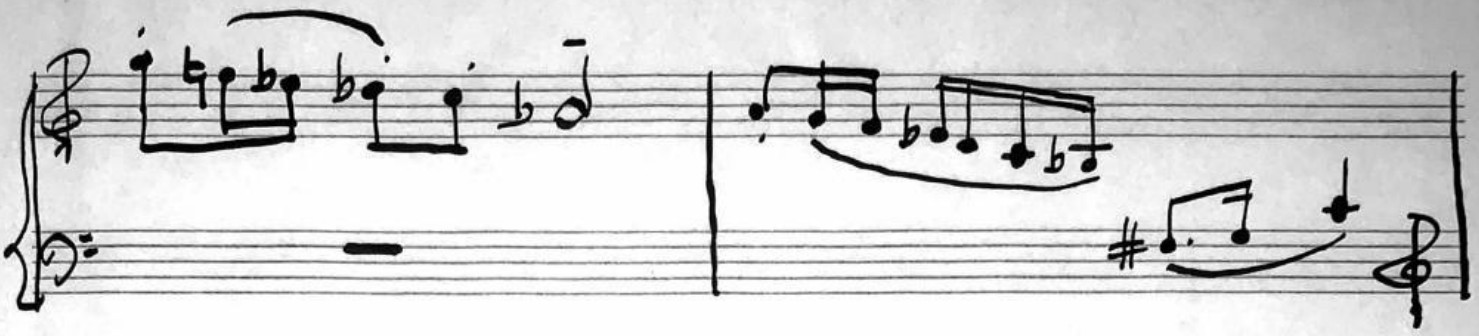
Sir Joshua Reynolds: "It is the very same taste which relishes a demonstration in geometry that is pleased with the resemblance of a picture to its original and touched with the harmony of music. All these have unalterable and fixed foundations in nature."



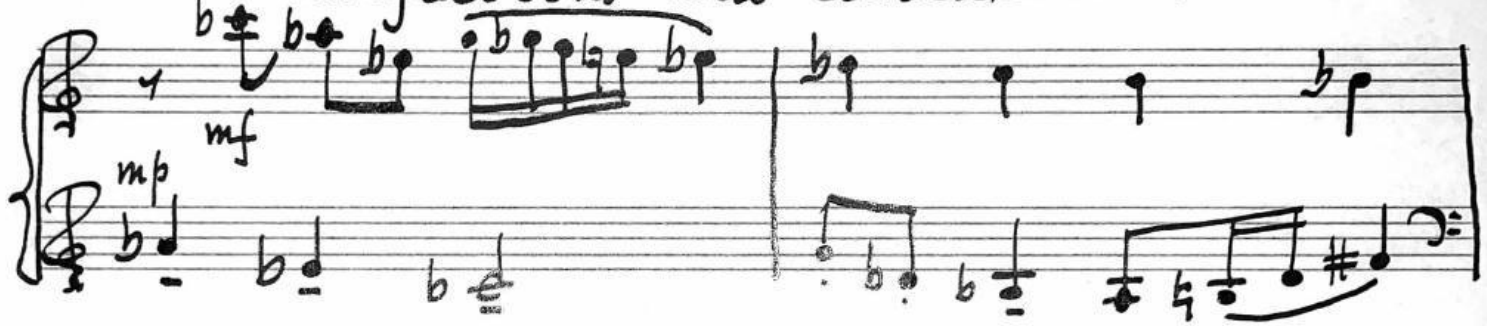
Leibniz: "Music is the pleasure the human soul experiences from counting without being



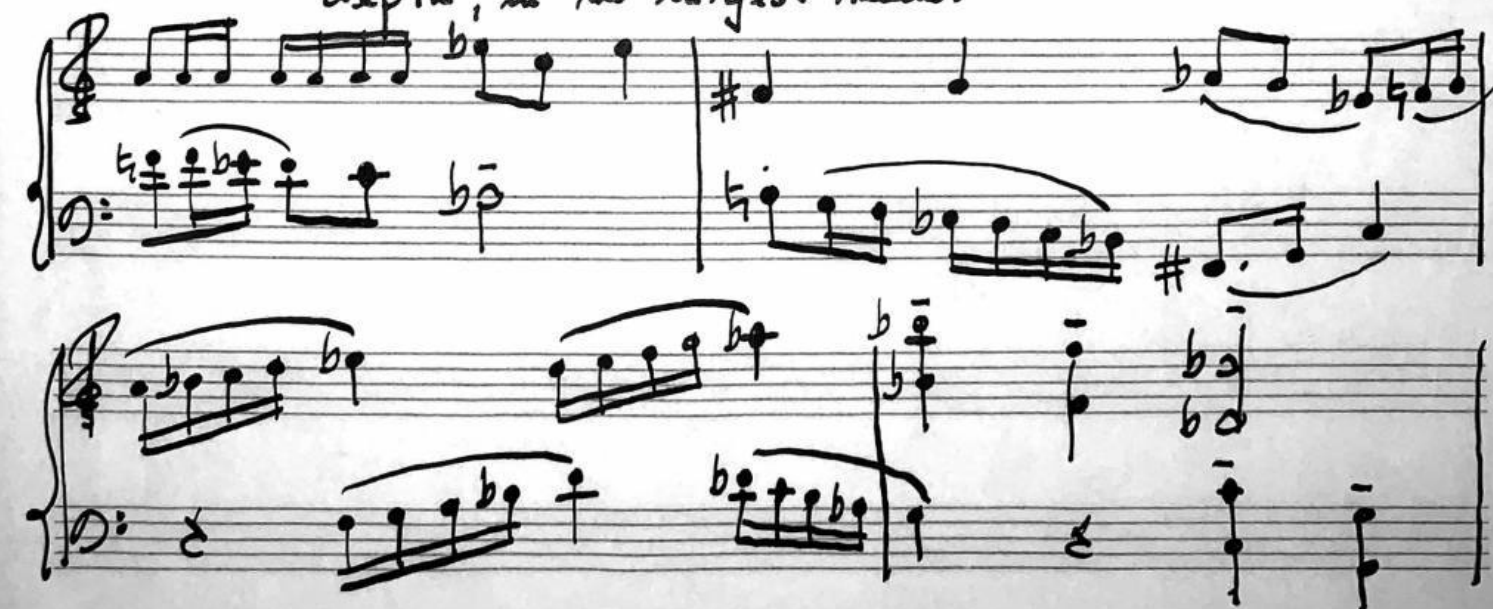
aware that it is counting."



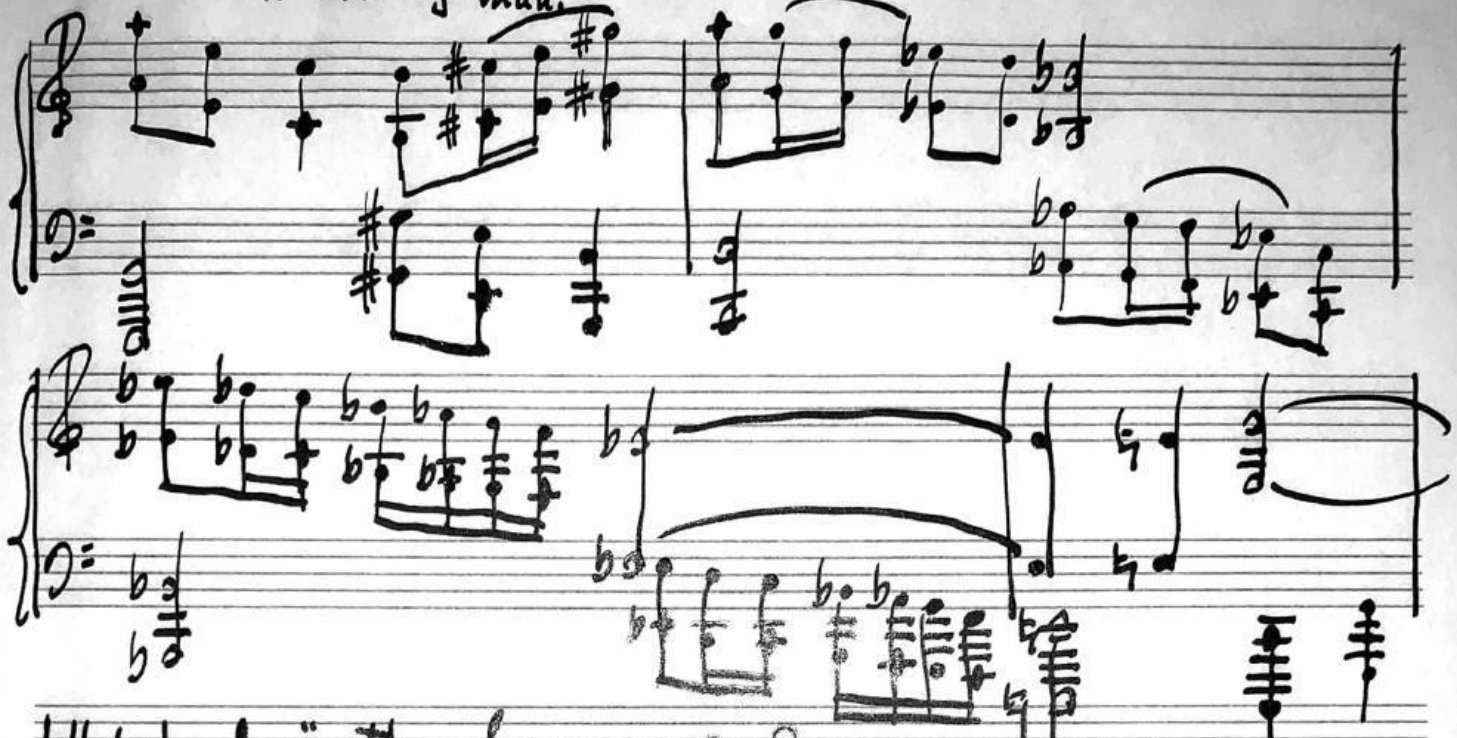
Fourier: "Music is transmitted by a series of rarefactions and condensations."



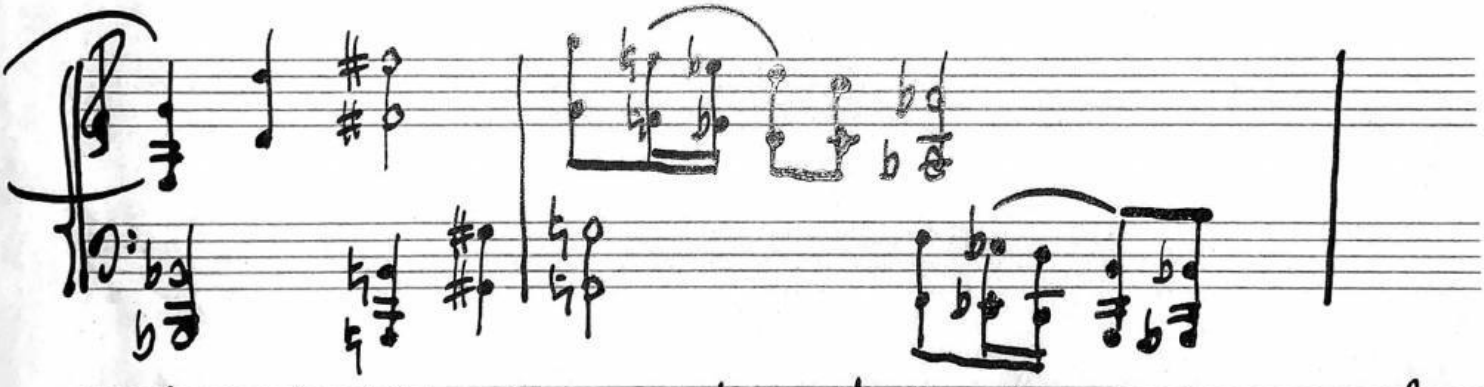
Voltaire: "We admit, in geometry ... infinite magnitudes infinitely greater, the one than the other. This astonishes our dimension of brains, which is only about six inches long, five broad, and sixth in depth, in the largest heads."



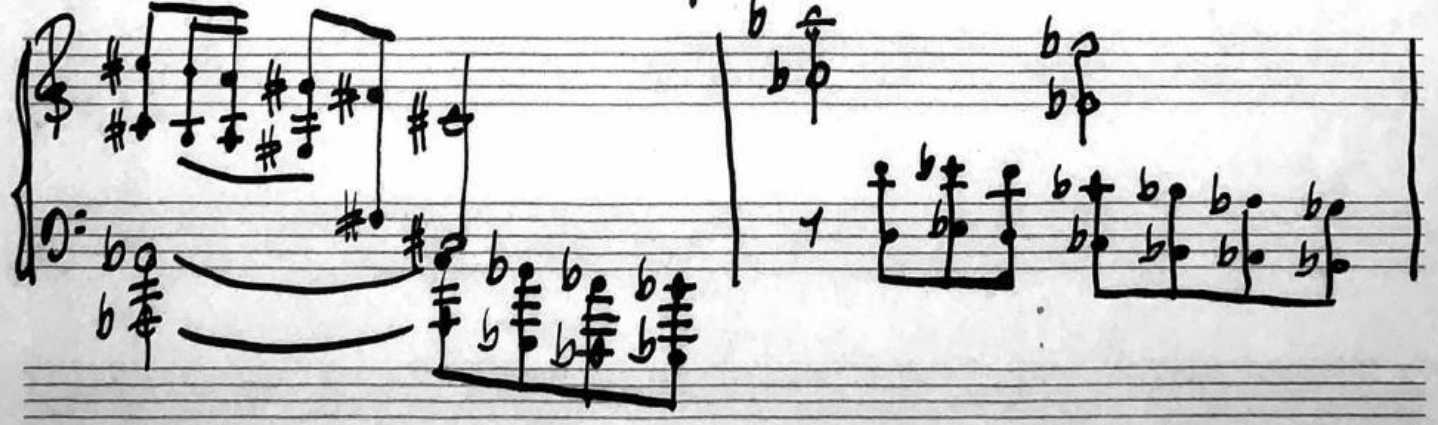
Rousseau: "The most useful and the least advanced of all the sciences is that of man."

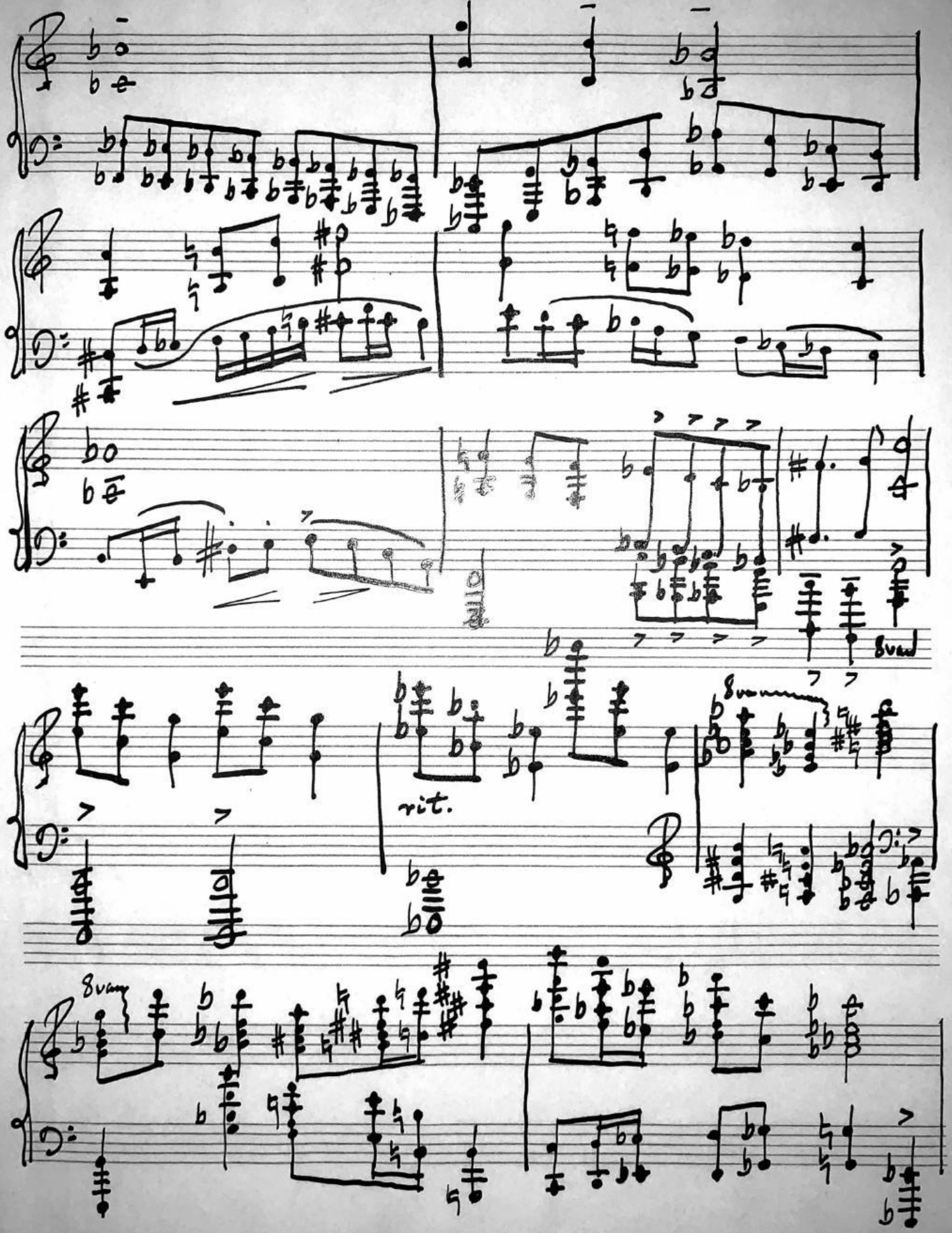


Whitehead: "The Science of Pure Mathematics, in its



modern development, may claim to be the most original creation of the human spirit."

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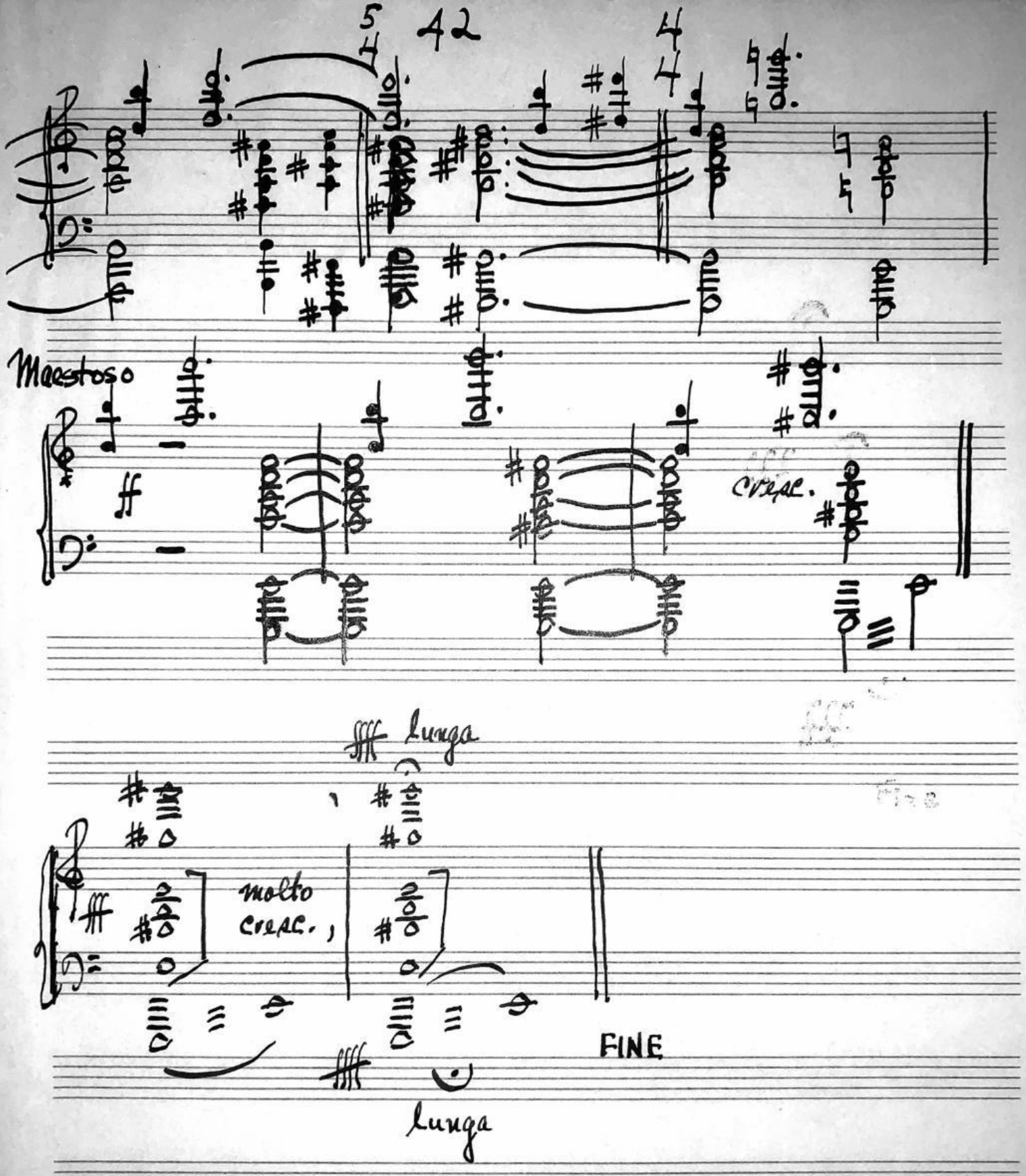
"Disillusionment with the old — a questioning of everything that came before — new acceptances — new beliefs!" "This is our goal for the future.

Tempo 1°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