MA 350 Dr. G. Stoudt
Fifteenth Reading Assignment

Readings

- Biography of Leibniz, page 383
- Reading 72: From "A New method for Maxima and Minima as Well as Tangents, Which is Impeded Neither by Fractional Nor by Irrational Quantities, and a Remarkable Type of Calculus for This"-Gottfried Wilhelm Leibniz
- Reading 73: From "Supplementum geometriae dimensoriae. . ." in Acta Eruditorum (The Fundamental Theorem of Calculus)-Gottfried Wilhelm Leibniz
- Biography of Newton, page 395
- Reading 74: From *Specimens of a Universal [System of] Mathematics*-Isaac Newton
- Reading 75: From a Letter to Henry Oldenburg on the Binomial Series (June 13, 1676)- Isaac Newton
- Reading 76: From a Letter to Henry Oldenburg on a General Method for Finding Quadratures (October 24, 1676)-Isaac Newton
- Reading 77: From *Principia Mathematica* (Prime and Ultimate Ratios: The Theory of Limits)-Isaac Newton (stop after Corollary of Lemma IV and begin again on page 410 after it reads "[Text is omitted here.]". Then read to the end.)
- Reading 78: From the Introduction to the *Tractatus de quadratura curvarum*-Isaac Newton

Notes for the Readings

Leibniz uses differential notation: dx, dy, etc. Leibniz's figure 72.1 is also rotated -90° of what we would normally see.

On page 393 when Leibniz says "elements of the coordinates" you should think "differentials of the coordinates."

You may have heard of a heated "calculus controversy" over who first invented calculus, but note in Readings 74, 75, and 76 how cordial Newton is towards Leibniz.

Questions for Discussion

Reading 72

1. Find the sum, difference, product, and quotient rules in the reading.
2. Find the notion of the derivative indicating increasing and decreasing in the reading.
3. Find rules for maxima/minima, concavity and points of inflection in the reading.
4. Find the power rule in the reading.
5. Why do you think Leibniz does such a "hard" example (p. 390)?
6. Find the first calculus proof of the law of refraction.

Reading 73

This is a big one; we will go through it in detail. Be ready.

Reading 75

1. In Newton's Example 1, write down and be specific about what is represented by P, Q, A, B, C, etc.
2. Find the binomial series for Example 1 using the modern formula.

Reading 76

1. So basically, how does Newton integrate complicated functions?

Reading 77

1. Compare Lemma II with the ideas of Archimedes.
2. Compare Newton's theory of limits with ours.
3. Could Newton's theory of limits be used in the classroom? Why or why not?
4. How do “moments” and “differentials” compare?
5. Find Newton's power rule in the reading.

Reading 78

1. Make sure you understand the concepts of “fluent” and “fluxion.”
2. Find the characteristic triangle in the reading.
3. Look to find where Newton uses the notion of secant lines becoming tangent lines.
4. Newton does not prove the Fundamental Theorem of Calculus here, but he mentions it. Where?
5. We will go through the calculations, so be ready with ideas.