

Honors Project Assignment

Honors Calculus 1, Fall 2010

In order to make this class an honors class, the tests include questions a bit more challenging than “regular” Calculus 1 tests, and you will do an honors project. The project will consist of a written report and an in-class presentation. The written report may include websites as references but *must* include at least two written works as references (books or journal articles) and should be 5 to 7 pages long. The presentation should be given in PowerPoint, may include videos to illustrate your topic (but keep videos brief—no more than 2 minutes), and should be 13 to 15 minutes long. When giving your presentation, actually *present* your material, do not simply read from your report. The more mathematical content of your report (which you understand), the better! The written reports are due Monday December 6 and the presentations will be given December 3, 6, 8, and 9.

The following topics are appropriate for the project:

- **Mathematical Theory:** A proof and history of the Chain Rule; sequences, series, and infinity; improper integrals and their applications; the definition and properties of the real numbers; the Continuum Hypothesis and different levels of infinity, limits and derivatives in the complex setting.
- **Applications:** Rate equations in physical chemistry; dynamics problems related to physics or engineering (and the use of vectors); population dynamics models; fitness models and applications to population genetics.
- **History of Calculus:** A biography of Newton (concentrate on math); a biography of Leibniz (concentrate on math); Newton’s work of 1665–66; Newton’s ideas of fluxions and fluents; Leibniz papers of 1684 and 1686; Newton’s *Principia*; Calculus before Newton (Kepler, Archimedes, Cavalieri, Wallis) and early ideas of “quadrature.”

If you would like to do another topic, then let me know so that I can approve it. Each person must work on a different topic.

Possible References

1. Any calculus or analysis text. A physics text or physical chemistry text.
2. *The History of the Calculus and its Conceptual Development*, Carl Boyer, New York: Dover, 1959. Sherrod Library has this one (call number QA303.B69.1959).
3. *The Mathematical Papers of Isaac Newton*, edited by D. T. Whiteside with the assistance in publication of M. A. Hoskin. Cambridge: Cambridge University Press, 1967-1981. Sherrod Library has this one (call number QA35.N5647).
4. *Sir Isaac Newton’s Mathematical Principles of Natural Philosophy and his System of the World*, translated into English by Andrew Motte in 1729 and supplied with an historical and explanatory appendix, by Florian Cajori, Berkeley: University of California Press, 1960. Sherrod Library has this one (call number 531.N484).
5. *A Source Book in Mathematics* by David Eugene Smith, New York: McGraw Hill, 1929. Sherrod Library has this one (call number 510.Sm54). This includes excerpts for Leibniz’s 1684 and 1686 papers.
6. Any History of Math book.