Mathematics 3010 Final Exam **Name:** _____

1. (3 pts) Who invented logarithms, and to what science did he apply them?

2. (4 pts) What is a fluxion?

3. (8 pts) Has Euclid's fifth postulate been proved? What are the prospects for the future?

4. (10 pts) Write a short essay on the history of Calculus from Descartes and Fermat to Newton and Leibniz. Include as much concrete information as possible.

5. (5 pts) Who raised objections about rigor in calculus? Give the responses of at least three mathematicians.

6. (10 pts) Give either a) a short history of the solution of the cubic equation, or b) a short history of the reform of astronomy begun in the 16th century. Do only one.

7. (12 pts) Write the discoverer/inventor for the following symbols.

+	
=	
dx	
f’	
letters as variables	
variables from the end of the alphabet	

8. (10 pts) Find the first four terms of the power series expansion of $(1+x)^{2/3}$ using Newton’s method.

9. (8 pts) Find d(xy) using Leibniz’ techniques. That is, prove the “Leibniz rule”.

10. (8 pts) Use Fermat's technique of "adequality" to find the locations of the potential maximum and minimum values of the function x^2-ax.

11. (8 pts) Find the length of the subnormal v to the curve $y = x^{3/2}$ at $x = 2$.

12. (8 pts) Give a short account of the brachistochrone problem and its solution.

13. (6 pts) Find the smallest number that leaves a remainder of 1 when divided by 2, 2 when divided by 3, and 4 when divided by 7.

Bonus problem: Give an example of an infinitely differentiable function with no Taylor series (or more precisely, a Taylor series that converges only at a single point) and explain it.