**Mathematics-Science 380 – History of Mathematics**
Trent University, 2006–2007

**Assignment #6**
*Due in the week of 8 January, 2007.*

**1.** Write a poem which either
   *i.* states and proves a non-trivial result such as the Pythagorean Theorem, or
   *ii.* gives a brief description of an ancient number system. *[8]*

**2.** A two-player game (in which the players take turns making moves) is considered to be *finite* if it cannot go on forever when played by the rules. For example, tic-tac-toe is finite. So is chess, thanks to some obscure rules about about the game being an automatic draw if no one captures a piece, moves a pawn, or delivers checkmate in a certain number of moves. (50 by each player in most situations, but there are a few exceptions.) The two-player game SUPERGAME is played as follows: the first player chooses a finite two-player game, which the two players proceed to play out with the second player going first. Is SUPERGAME itself finite? Why or why not? *[2]*

## An Ode to a Derivative

Oh, Derivative, your form may be
Anything . . . say quadratic.
And any time I must deal with you
My pulse becomes erratic.

For once I've found you, Derivative,
You enable me to see
That rate at which equations change,
Whatever that may be.

Derivative, you are the limit
As "h" approaches zero.
And when I need a tangent's slope,
You always are my hero.
    (Unless you're feminine:
    then you're my heroine!)

But when I want *your* rate of change,
That's a thing you never give.
So I must find your other form:
The Second Derivative!

And if it's o'er your non-differential form
Which I wish to mull
Then, again, must I change your beauteous shape
And find your integral.

And lo! in this form there is hope,
If you will observe,
For in this form you show me
The area under the curve.

Implicit or explicit,
Your beauty is still stunning.
Though it may make some people
Turn their tails and start running.

But they can't outrun you, Derivative,
No matter how they try;
Your tangents reach from the deepest seas
And up into the sky.

And you've many diff'rent notations,
Some simple, some complex.
I've known you to be just $y'$,
Or $f'(x)$.

But whatever your form, Derivative,
No matter which you choose,
The form which Leibniz gave to us,
I shall always use.

For we owe so much to old Leibniz;
He fulfilled his mathematic duty
By making you, Derivative,
A simple thing of beauty.

*Jim Newman*