

◊ ALGEBRA SEMINAR TALK ◊

FRIDAY, JANUARY 30, 2009

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3:30 P.M. – Middlesex College Room 106

“Inverse functions and Matrix functions: Connection with Lambert W”

ABSTRACT: This talk combines two ideas: inverse functions and matrix functions.

Given a function $f(z)$, it is a standard procedure to define an inverse function through the solution of the equation $f(z)=w$. If we denote the inverse function by $\text{inv}f$, then we can write $z=\text{inv}f(w)$. The definition is often complicated by the fact that there are multiple solutions of the equation.

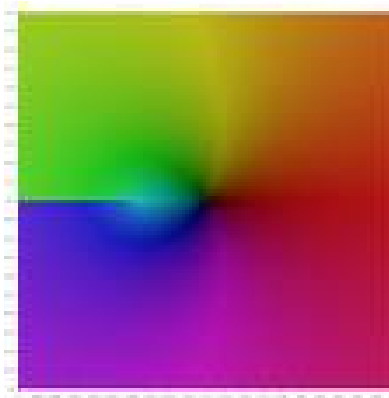
Given a scalar function $f(z)$, there are standard procedures for extending the definition to a matrix argument. For example, integer powers of a matrix, or the exponential of a matrix.

There are two ways in which one can arrive at a definition of the inverse of a matrix function. First, one can define the scalar inverse and then extend the definition to a matrix argument; second, one can extend the definition of the equation $f(z)=w$ to matrices and then consider its solutions.

These definitions are discussed in the context of the Lambert W function, which is the inverse of the function $f(z) = z*\exp(z)$.



Johann Heinrich Lambert



L to R: Gaston Gonnet, Rob Corless, Don Knuth, David Jeffrey

What do the enumeration of trees, time-delayed differential equations, general relativity, and quantum mechanics in lower dimension all have in common? You guessed it - the Lambert W function! And here in our Middlesex College building are at least two world experts in this beautiful, mysterious subject, and one of them will speak to us this Friday! ☺ **ALL ARE WELCOME!**