



AMERICAN UNIVERSITY  
WASHINGTON, D C

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THE DEPARTMENT OF MATHEMATICS AND STATISTICS COLLOQUIUM

# Elliptic integrals and the group structure of an elliptic curve

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Ward 303

**Abstract:** This is an elementary talk on a classical topic from an algebraic geometry point of view. In calculus, one deals with integrals of the form  $\int_0^x \frac{ds}{\sqrt{1-s^2}}$ . It can be thought of as the integral along the curve  $x^2 + y^2 = 1$ . Gauss, Abel, and others in the 19<sup>th</sup> century showed that it is best to deal with them in terms of the inverse function  $x = x(t) = \arcsin t$ .

An elliptic integral has the form  $\int_{P_0}^P \frac{dx}{y}$ , where  $P_0, P$  are points on the curve  $C: y^2 = f(x)$ , with  $f(x)$  a cubic or quartic polynomial in  $x$ . We will see that such integrals are invertible and naturally yield a group structure on the curve  $C$ .

*Presented by*

THE AU MATH/STAT DEPARTMENT AND THE AU CHAPTER OF SIGMA XI

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Next Colloquium:

**Friday, November 1, 2002** Ward 303

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**Ezra Brown**, Somewhere

*TBA*

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