BI-CO MATHEMATICS COLLOQUIUM

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"The Math and Magic of Financial Derivatives"

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Talk at 4:00 – Park 328
Tea at 3:30 – Park 355, Math Lounge

Abstract:

Are Financial Derivatives an `Engine of the Economy`, as declared by Alan Greenspan, or `Weapons of Mass Destruction', as Warren Buffett views them?

Over the last 30 years, financial derivatives have overtaken stocks and bonds as the investment vehicle of choice for many large investors. Derivatives are often behind the spectacular profits of investment banks as well as the mind-boggling losses (e.g. at AIG) that we read about in the papers.

So what are derivatives? Simply put, they are contracts between two parties that stipulate some cash flow over a certain period of time. The size of that cash flow depends on what happens to some underlying asset, such as a stock prices, interest rates, currency exchange rates or commodity prices.

The uncertainty in the development of the underlying creates the key difficulty, which is to properly evaluate the price and the risk inherent in a derivative. In this talk I will give an overview of the three main methods to price derivatives:
1. The analytic method by Black and Scholes, culminating in their famous partial differential equation.
2. The discrete approach by Cox-Ross-Rubinstein, based on binomial trees.
3. Monte-Carlo Methods, which average information obtained from simulating a large number of random walks of the underlying asset.

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