the author.

The article that follows is the first in a series of brief reports from each of the CF II workshops to be published by *MAA FOCUS* in 2009. The CF II planning committee welcomes your comments and input.

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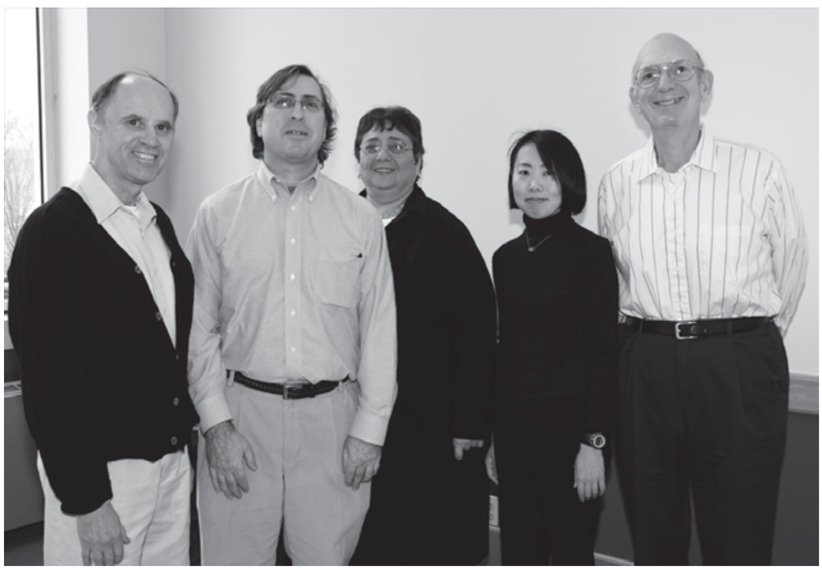
The Curriculum Foundations Workshop on Economics

Sheldon P. Gordon and Richard Vogel

Farmingdale State College recently organized and hosted the Curriculum Foundations II workshop on mathematics and economics. This invitational workshop brought together 15 leading economics educators from around the country to develop a set of recommendations to the national mathematics community on the current mathematical needs of the one million undergraduate students nationally who take economics and related courses each year. The results of these discussions will be used to promote the development of new courses and programs that will better serve the needs of economics students in an increasingly quantitative world.



Participants at the Curriculum Foundations Workshop: Jack Winn (Math), Richard Vogel (Econ), Eleanor Fapohunda (Econ), Natsuko Iwasaki (Econ), and Sheldon Gordon (Math).

Economics, finance, and business-related professions are becoming increasingly mathematical, and both the undergraduates majoring in these disciplines and the vast numbers of students who take the introductory courses in these fields need a deeper — and different — kind of mathematical preparation than has been the case historically. According to the economists at the workshop, their students need much more emphasis on understanding fundamental mathematical concepts than on developing a broad collection of algebraic skills. They also need to see realistic applications in their math classes that mirror the way that mathematics is used in business and economics classes. The economists welcomed the invitation to communicate these needs to the mathematics community, so that they will be able to produce graduates who are better equipped to function effectively both in modern economics programs in college and in careers that are a part of an expanding global economy.

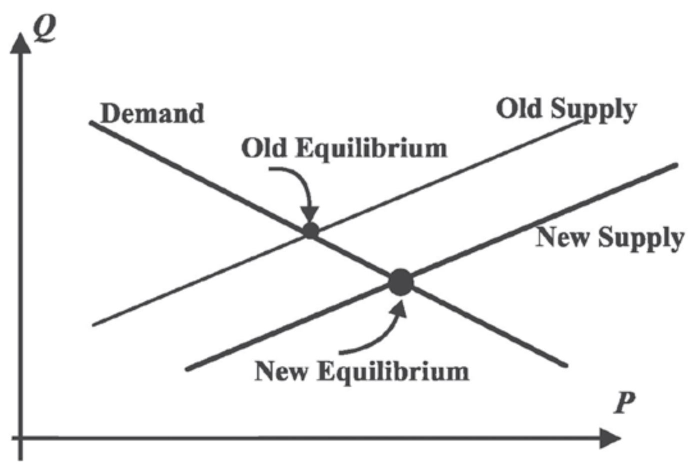


Figure 1: Moving *Along* a Curve

Although the intended focus in the workshop was to be on the mathematical needs of undergraduate economics majors, the participants found it impossible to separate those issues from the related ones for the huge numbers of students who take only an introductory economics course (i.e., macroeconomics and microeconomics). Fully 98% of all economics enrollments are in these courses, and they are the foundation for all the intermediate and advanced economics offerings that are taken by the economics majors and by those students in related fields.

Many of the specific details brought up by the economists tend to be somewhat subtle points, certainly for students and possibly for many mathematics faculty members. For instance, although they talk about students needing partial derivatives, it is not so much a matter of calculating the partial derivative of a given function (they rarely have explicit functions to differentiate), but rather to interpret the economic significance of the *sign* of the partial derivative — meaning, as each of the parameters increases or decreases, what is the effect on the function?

Also, a major theme that pervades the introductory and intermediate courses is the Law of Supply and Demand. Here, economists study the price, P, and the quantity, Q, of a product, but the historical convention is to place Q on the vertical axis and P on the horizontal axis, even though P is the dependent variable. One of their complaints is that most students are uncomfortable with variables other than x and y, and the reversal of the axes is something that certainly contributes to the confusion. Moreover, while the economists talk about the supply and demand *curves* in introductory courses, they actually use *lines* that are still referred to as curves. However, the mathematical description of the behavior of curves in terms of concavity changes dramatically from that shift in the dependent/independent variable depiction. Another major issue is the notion of "moving along a curve" in the sense that a change in either the demand or the supply curve produces a different (albeit parallel) line (see Figure 1). Again, this gets into the concept of the effects of changes on the parameters and the resulting change in the equilibrium (the point where the lines, or curves, cross).

The final draft of the report and other details about the workshop can be found at http://snyfarvc.cc.farmingdale.edu/~gordonsp/CurrentProjects/CFWorkshop.html.

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Sheldon Gordon is Distinguished Teaching Professor at Farmingdale State College of SUNY. He is a member of CRAFTY and takes its name, Curriculum Renewal Across the First Two Years, very seriously. Richard Vogel is Professor of Economics and Chair of the Department of History, Economics and Politics at Farmingdale State College of SUNY. He is treasurer of the Academy of Economics and Finance and a member of the board of directors of the New York State Economics Association. Gordon and Vogel were co-chairs of the workshop.