Short Bio for Michael Fried: 02/20/21

Background: Fried got his Phd. from Univ. of Michigan in Mathematics (1964-1967); from 1959–1961 he got his undergraduate degree from Mich. State Univ. in Electrical Engineering. Between those degrees he worked for 3 years as an Aerospace Electrical Engineer. This included work on the *Lunar Excursion Module* (deposited astronauts on the Moon), the *Nautilus submarine* (carried nuclear war heads in arctic seas) and the *Saturn missile* (pushed the Module to the Moon).

He has 100+ research papers in pure mathematics journals, two large research monographs, 5 edited volumes and several papers in educational assessment technology. He chose the two years of postdoctoral at the Institute for Advanced Study in Princeton (and returned for another period there later) over Harvard's Benjamin Pierce fellowship. Then he chose – at 26 – a position at SUNY at Stony Brook over tenure at University of Chicago. James Ax invited him after Ax was awarded a Cole Prize. Fried left Stony Brook for University of California at Irvine as a full professor.

Before living in Montana in 2004, he was a Professor of Mathematics at:

- State University of New York at Stony Brook (8 years),
- University of California at Irvine (26 years),
- University of Florida at Gainesville (3 years); and
- Hebrew University in Jerusalem (2 years).

Several of those appointments were overlapping. After living in Montana for 14 years, he has been an Adjunct Professor of Mathematics at University of Colorado at Boulder.

His fellowships include these:

- *Alfred P. Sloan foundation* ('72–'74),
- *Lady Davis Fellow* at Hebrew University ('87–'88),
- a *Fulbright* spent at Helsinki University ('82–'83), and item an *Alexander von Humboldt Research Fellowship* ('94–'96).

He has been a visiting professor at M.I.T., Univ. of Michigan, Univ. of Florida, Hebrew Univ. and Tel-Aviv Univ. He has been an editor on several mathematics journals including the *Research Announcements of the American Math. Society*, the *Journal of Finite Fields*; and Editorial Board of Mathematics (OA Journal for Enpress). He continues to serve on the last two.

He was included in the inaugural (2013) class of *Fellows of the AMS*. He is (2018) an *Albert Nelson Marquis Lifetime Achievement inductee* in Marquis Who's Who.

John Thompson inaugurated his most important working period when Thompson asked Fried to work with him U. of Florida. Thompson is recognized as one of the most prized American mathematician of the 20th century. In particular, he has a Fields Medal, Israel Prize and a Presidential Medal of Honor.

Fried's influence on the work of Thompson came through the *genus 0 problem*, on Pierre Dèbes and Robert Guralnick through the *monodromy method*, and on Helmut Völklein through the use of Hurwitz spaces applied to the regular version of the *inverse Galois problem*. Fried's most significant ideas are the Galois Stratification procedure (from which Denef and Löeser derived their procedure for attaching canonical *motivic* series to a wide range of diophantine statements) and his *Modular*

Tower program (that generalizes most aspects of work on modular curves through its connection to the Inverse Galois Problem).

Goals as a mathematician: Mathematics has a language for breaking tough problems into easier pieces. Trying to solve complicated equations reveals practical aspects of a theoretical difficulty. You rarely can solve them in one important sense. Though solutions may *exist*, they will not be related to functions studied previously. Rather than solutions, however, most scientists want properties of solutions. Fried uses *group representation theory* to avoid solving equations. This is the *monodromy method*. It often reveals symmetries connecting problems from one area to research tools from another. This has solved some renown problems.

- Schur's conjecture.
- Davenport's problem.
- The Galois stratification procedure for constructing zeta functions attached to diophantine statements (Annals, 1976).
- Description of exceptional polynomial covers over finite fields (Israel Journal, 1993).
- Enhancement of Shafarevich's conjecture to present the absolute Galois group of the rationals as an extension of known groups, and the 1st cases achieving that (Annals, 1993, Israel Journal 2010).
- Recognizing Mazur's result bounding modular curve rational points as a special case of the Regular Inverse Galois problem (London Math. Soc, 1997, Israel Journal, 2010).
- The Open Image Theorem Conjectures and results applied to Modular Towers generalizing Serre's Theorem on modular curves (2018).

Goals as an educationalist: Fried's work in educational technology includes grants for development of educational assessment software (with Sloan foundation and National Science Foundation). A particular topic: Retention of students using interactive e-mail portfolios. As a teacher/researcher his forté is connecting problems in one domain to solutions from another.