# Happy 60<sup>th</sup> Birthday, Jim!



October 19, 2015

### Six Books

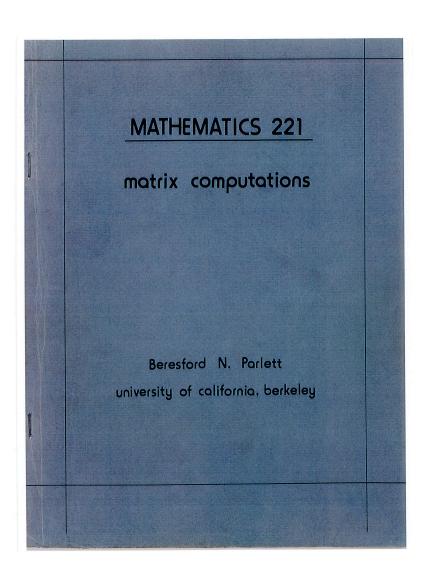


Celebrating Jim Demmel's 60<sup>th</sup>
Birthday
October 24, 2015

### Six Books

- 1. Student
- 2. Apprentice
- 3. Family
- 4. Colleague
- 5. Teacher
- 6. Impact

## 1st Book - Student



Math 221 Lecture Notes by Beresford Parlett

Took this class with Jim during Fall Quarter 1978 (Ole Hald)



# We did not have PhD Comics back in 1978, but ...





# Found in my copy of Math 221 lecture notes



Copy of article from "Psychology Today", 1982.

machines—those calculators and computers supposedly, created to simplify our lives by providing quick solutions to time-consuming problems—are no substitute for certain basic thinking and reasoning skills.

Robert E. Revs. a mathematics educator at the University of Missouri in Columbia and the principal investigator involved in the calculator study, says that his findings should not be misinterpreted as an argument against allowing students to use hand-held calculators. Instead, he says, the results underline the importance of students developing an awareness of calculator errors and an unwillingness to be intimidated by a result that doesn't square with their ballpark estimate of the answer. The same attitudes will eventually have to develop in people who use the verbal counterparts of calculatorsthe newfangled machines and programs that supposedly correct bad punctuation and misspelled words. Psychologist Susan Chipman, assis tant director of learning and devel opment at the National Institute of Education (NIE) in Washington warns that despite the claims of th ads in microcomputer magazines "in truth, there are still serious limit tations on what can be done with language processors and artificial intelligence."

Reys and his associates, who included three math teachers, conducted a yearlong, \$63,000 study for the NIE on what they call "the most neglected skill in the mathematics curriculum—computational estimation." They wanted to find out what processes teenagers and adults use when neither pencil nor calculator is available, to decide, say, what size package is the better buy at the supermarket, how large a tip to leave at a restaurant, or whether that \$10 bill in their pocket will cover the items in the shoponine cart.

Researchers tested nearly 1,200 students (grades seven through 12) and adults in St. Louis, Columbia, and Cape Girardeau, Missouri, and in Escondido, California, on their ability to make mathematical estimates; the ones who scored in the top 10 percent were culled for follow-up interviews. Predictably, the researchers found that the best "esti-

mators"-not necessarily those able to do quick and exact mental arithmetic but those who could roughly estimate the answers to math problems-arrived at their conclusions by using shortcuts that included rounding off numbers or working with only the first digits. The good estimators tended to have a command of basic arithmetic processes and concepts, to be self-confident, and to have a tolerance for error. It's important, said one seventh-grader in explaining the ease with which he gave estimates, to "tell yourself not to end up getting bothered by

Reys believes that such skills are

Even when the calculator's figures were off by 50 percent, students didn't question them.

more critical than ever in an era when more than 80 percentol secondary-school students have access to calculators. Hence, a portion of the interview involved asking subjects to estimate the answers to seven problems and then to compare the accuracy of their estimates with results obtained by using a calculator. Some of the problems: 436 + 972 + 79: 42,962 + 73: 252 × 1.2.

There was one catch, however: The researchers had programmed the calculators to make systematically increasing errors in computing, giving answers that were from 10 percent to 50 percent above the real answer and above the range that they had determined as acceptable. Thirty-three students and 12 adults participated in this phase of the study. Thirty-one were male, 14 female. The results are surprising and disturbing. Only 20 percent of the participants-all of them male-recognized the unreasonableness of the result and voiced suspicion of the calculator after the first exercise. Most looked puzzled, besitated, repunched the sequence, or asked to work the problem out with pencil and paper, but did not directly voice any doubts before proceeding to the next problem.

By the time they reached the final problem, 36 percent of the females and 77 percent of the males had caught on. But almost a quarter of the males and nearly two-thirds of the females proceeded through all seven problems without verbally expressing any concern about the accuracy of the calculator.

"I must have entered it wrong on the calculator; either that or I'm thinking wrong," one student said. Another remarked: "It doesn't look right, but if that's what the calculator says, then it's probably right. It still doesn't look right."

One ninth-grader was typical of those who staved confused to the very end. In Exercise 1, he was asked to add 436 + 972 + 79. The acceptab e interval was 1,450-1,600, and the student estimated 1,480; the calculator said 1,627. The student mused, "So I was about 140 off," and went on to the next problem. After five highly accurate estimates on other problems, for which the calculator was "off" by 50 to 1,700, the student was totally puzzled. On Exercise 7, multiplying 252 x 1.2, he estimated 312.4, explaining that he had "multiplied 252 by 1, then 252 by .2, then added them together."

"So should that be pretty close?" the investigator asked.

"The way I'm going, I wouldn't say anything right now."

The student then used the calculator, which came up with 452.4, far above the acceptable interval of 252-350.

"Do you think that's pretty close?"
"My answer is about three-fourths
of it"

"So you're satisfied."

"Yes, pretty much. More than the

"As we look back, it looks like all of the exact answers are higher than your estimates."

"Yes, I usually underestimate except with money...."

"What do you think about your estimates?"

# 2<sup>nd</sup> Book - Apprentice

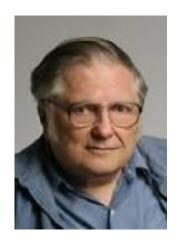
## THE ALGEBRAIC EIGENVALUE PROBLEM

 $\mathbf{BY}$ 

J. H. WILKINSON, M.A. (Cantab.), Sc.D.

CLARENDON PRESS · OXFORD 1965 Jim became Velvel Kahan's PhD student

Why Apprentice?



## About being Velvel's Apprentice

"When I was a grad student Wilkinson was visiting for a while, working with Velvel and Beresford. One time we met in the hallway in Evans, and he said to me: "You know, I don't think you're nearly as smart as your advisor thinks you are." I smiled and went on my way."



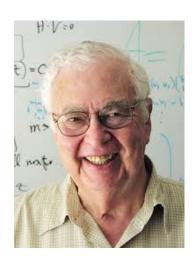
#### **Der Zauberlehrling**

The Sorcerer's Apprentice

Der Zahlenlehrling Zum Gedächtnis an Gene Golub The Numerical Apprentice
In memory of Gene Golub

Von J. Demmel

By J. Demmel



#### **Der Zauberlehrling**

#### The Sorcerer's Apprentice

#### Der Zahlenlehrling Zum Gedächtnis an Gene Golub

# The Numerical Apprentice In memory of Gene Golub

Hat der alte Matrixmeister
Sich für immer wegbegeben!
Und nun sollen seine Rechner
Auch nach meinem Willen
zählen!

The matrix-master's vanished
And forever gone away!
Programs called by him, now
banished,
My commands shall soon obey!

Seine Wort' und Werke Merkt' ich, und den Brauch Und mit Geistesstärke Werd' ich rechnen auch. Every step and saying
That he used, I know,
And with sprites obeying
My calculus I'll show.

Sende, sende
Manche Busse
Dass zum Zwecke
Data fliessen,
Und mit schnellen Protokollen
Zu dem Speicher sich
ergiessen!

Data flowing
Over busses
Spare not any
Cache prefetching
Ever streaming, tightly scheduled,
Toward the cache in packets
gushing.

### But there is more ...

WALLACE GIVENS Applied Mathematics Divison Argonne, III. 604<del>40</del> 37 WALLACE GIVENS
Applied Mathematics Divison
Argonne, Ill. 604#9

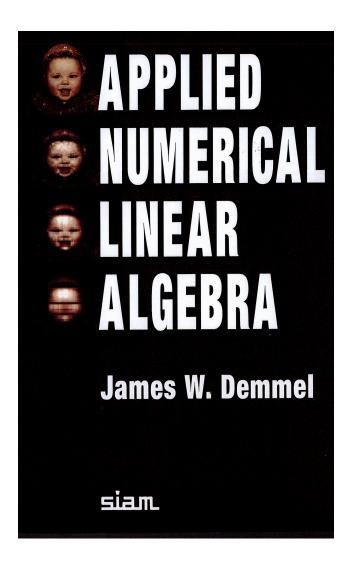


It is a pleasure to acknowledge the assistance I have received from numerous friends in this enterprise. I would like to thank Professors J. W. Carr and R. C. F. Bartels for successive invitations to lecture at the Summer Schools in Ann Arbor, thereby providing me with an annual stimulus for completing the manuscript. I am particularly indebted to Professors G. E. Forsythe and W. J. Givens who generously provided duplicating facilities for the two main drafts of the manuscript. This has enabled me to benefit from the opinions of a much wider circle of readers than would otherwise have been possible.

# So how did Givens' copy of Wilkinson's book find its way to Jim?

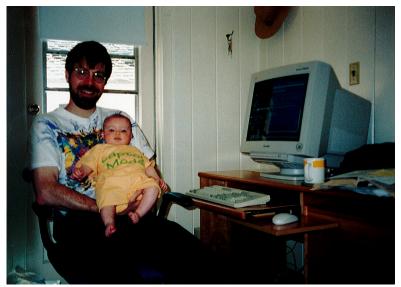


# 3<sup>rd</sup> Book - Family

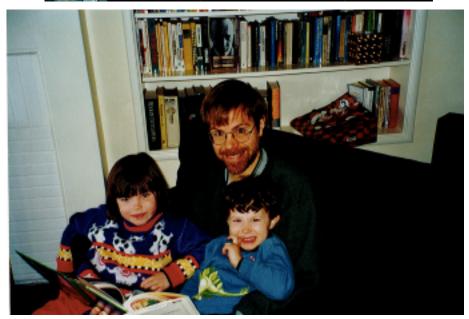


Appeared 1997, has been used at more than 45 schools

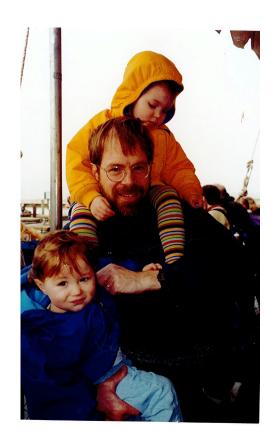
## Family Photos



Megan as "laptop model"



... and with Megan and Nathan



## Family Collaboration

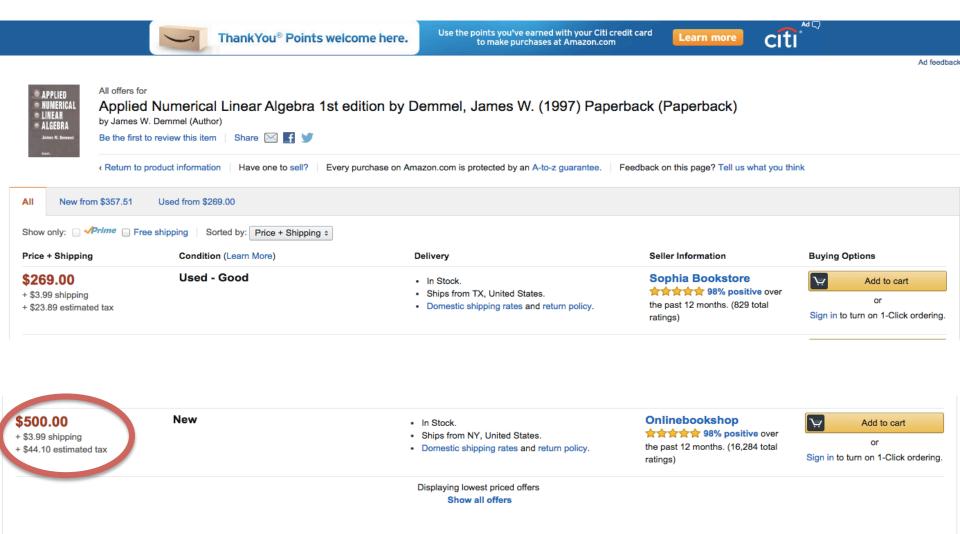




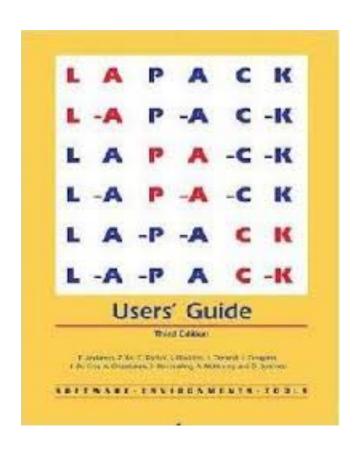
Jim and Kathy have 31 publications together, many about performance, autotuning,... but there is one that peaked my curiosity:

On Holder-Brascamp-Lieb inequalities for torsion-free discrete Abelian groups, October 2015.

# Don't Underestimate the Value of Applied Linear Algebra



## Book 4 - Colleague



LAPACK, ScalaPACK have been highly influential software projects.

They were also community projects that speak to Jim's collaborative spirit.



From left: Sven Hammarling, Z. Bai, Anne Greenbaum, Ed Anderson, Alan McKenney, Jack Dongarra, Jeremy DuCroz, Jim Demmel

### From an unnamed collaborator

"Horst,

I don't have any good stories about Jim that would be embarrassing or amusing ... "

### Book 5 - Teacher

#### U.C. Berkeley CS267 Home Page

**Applications of Parallel Computers** 

Spring 2015

T Th 9:30-11:00, 306 Soda Hall

#### Instructor:

- Jim Demmel
  - · Offices:

564 Soda Hall ("Virginia", in ParLab), (510)643-5386 831 Evans Hall

- Office Hours: (subject to change) MWF 10-11 (starting Jan 21)
- (send email)

#### **Teaching Assistants:**

- · Evangelos Georganas
  - Office: 5th Floor Soda Hall (ASPIRE Lab)
  - Office Hours: T/Th 1-2pm, in 283E Soda Hall (updated Jan 19)
  - (send email)
- · Forrest Iandola

Not a book, but some of the most influential lecture notes

# CS267 at EECS UC Berkeley and Worldwide

- Taught annually since 1993, with help of many of us here today
- Lecture notes used at many universities
- Adopted for world-wide broadcast by NSF/ XSEDE
- SPOC (small personalized online course) with about 150 students at 17 universities in 2014

#### **Mathematics Genealogy Project**

#### **James Weldon Demmel**

**MathSciNet** 

Ph.D. University of California, Berkeley 1983



Dissertation: A Numerical Analyst's Jordan Canonical Form

Advisor: William Morton Kahan

Students:

Click <u>here</u> to see the students listed in chronological order.

Name			School		Year	Descendants
Grey Ballard	University	of	California,	Berkeley	2013	
David Bindel	University	of	California,	Berkeley	2006	
<b>David Blackston</b>	University	of	California,	Berkeley	2000	
Tzu-Yi Chen	University	of	California,	Berkeley	2001	
Mark Hoemmen	University	of	California,	Berkeley	2010	
Plamen Koev	University	of	California,	Berkeley	2002	
Jiawang Nie	University	of	California,	Berkeley	2006	
Huan Ren	University	of	California,	Berkeley	1996	
Edward Riedy	University	of	California,	Berkeley	2010	
Richard Vuduc	University	of	California,	Berkeley	2004	1

According to our current on-line database, James Demmel has 10 students



**Students** 



Sherry Li

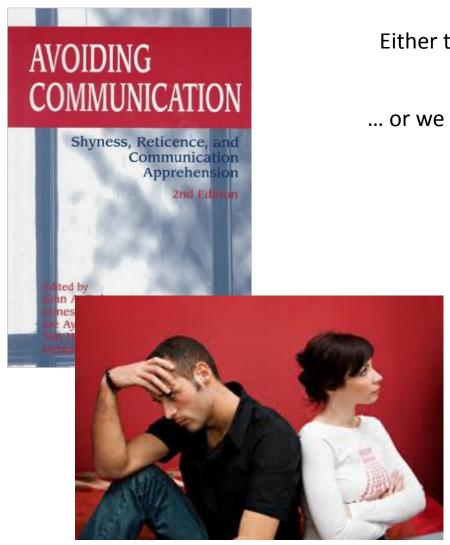
## Book 6 – Impact The book that still needs to be written

Communication Avoiding Algorithms

By Jim Demmel

Berkeley 2020

### Because otherwise ...



Either the psychologists will claim the field,

... or we will have very fast, but incorrect computations



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