In 50 years of classroom teaching and 11 years in retirement, I've written these textbooks:

- *Algebra 1: Expressions, Equations, and Applications*
  First Edition 1984, Latest Edition 2006
- *Algebra and Trigonometry: Functions and Applications*
  First Edition 1980, Latest Edition 2006
  Revised Edition, graphing calculator active, available in PDF form — 2012
- *Trigonometry: Functions and Applications*
  First Edition 1977, Latest Edition 1990. Available only on-demand as a subset of *Precalculus*
- *Precalculus with Trigonometry: Concepts and Applications*
  First Edition 1987, Latest Edition 2012
- *Calculus: Concepts and Applications*
  First Edition 1998, Latest Edition 2010

These texts were written to consolidate and make available to others the approach to teaching mathematics that I developed and perfected for my own students at Alamo Heights High School. Algebra 1, Algebra/Trig, Trig, and Precalculus were first published by Addison-Wesley. Calculus and later editions of Precalculus were published by Key Curriculum Press, and are now (2022) available from Kendall Hunt, both electronically and in hard cover "on-demand." The two Algebra texts wound up with Pearson, which recently spun off its textbook division to Savvas Learning. The revised edition of Algebra/Trig is in manuscript form for use by schools. If another publisher is found, Savvas has a 60-day "right of first refusal" to publish it themselves. The Trig text is no longer published as a separate text, but the trig chapters of Precalculus can be ordered on-demand from Kendall Hunt.

Each text was field tested with teachers in other schools from East to West Coasts. Algebra 1 was also tested with adult students at U. Mass, Amherst. It was ranked Number 1 in the United States by the organization Mathematically Correct.

In my visits to field-test students and their teachers, each student answered questions concluding with, "What is the one most important thing you learned as a result of taking this course?" At a parochial school near Chicago, most test students were seniors taking algebra to "look good on their transcript." One girl answered, "Well, I learned I'll never be a mathematician. But now I know what they *do*." A perfect outcome for this kind of student!

My decision to enter the teaching profession followed an undergraduate degree in chemical engineering and four years in the U. S. Navy as an Engineering Duty Officer, working on the design, construction, and testing of nuclear submarines. This background made me realize that the traditional "word problems" I had solved as a high school student in England and America are not the way mathematics is applied in the "real world." In these traditional problems, students find just *one* answer. Thus, x is just an "unknown constant," not a "variable."

More realistic applications involve finding a *relationship* among two or more variable quantities. For instance, the pressure a person's heel exerts on the floor is directly proportional to their weight, and inversely proportional to the square of the heel width. Given the pressure, weight, and heel width of a particular person, students can derive an equation and use it to predict pressures exerted by people of various weights with various heel widths. Results can be surprising. For instance, a 100-pound girl wearing a spike heel can exert 2000 pounds per square inch pressure on the floor. The variables really *vary*.

Having taught Advanced Placement Calculus each year since 1962 (my second year in teaching), I realize that, in calculus, students study the *rate* at which variables vary. If they have never been exposed to variables varying, they must learn this unfamiliar calculus concept based on the as-yet unfamiliar variable concept. Learning two new concepts at the same time is a recipe for failure, a lesson learned from my Commanding Officer, Admiral Rickover. He insisted that the first nuclear reactor be placed in a conventionally shaped submarine hull, and that the first submarine with the streamlined cigar-shaped hull be powered by conventional diesel engines.

A guide in writing instructional materials is that students learn better by actually *doing* mathematics, not just by hearing the teacher tell about it. The 100+ Explorations that accompany each text are designed for students to be exposed to a topic or concept before a more formal classroom presentation. For example, the potentially perplexing concept of logarithms becomes obvious when students use their calculators to find, say, log 7. They get 0.84509… . They store this in the calculator's memory, without rounding, then raise $10^{0.84509\ldots}$. The answer is exactly 7! After several such examples, students are asked to verbalize an answer to, "What is a logarithm?" Sooner or later, someone comes up with something like, "It's the power you raise 10 to, in order to get the number you started with." The readability of the texts comes from insightful words spoken by students.

The "variables really vary" concept can bring to life the 11 field axioms, and the axioms of equality and order, on which mathematics is based. For instance, the seemingly trivial reflexive axiom, stated tersely as, $x = x$, really says, "A variable stands for one number at a time." Like a memory cell in a computer, a variable can "contain" different numbers at different times, but only one number at any one time. This explains why you must substitute the *same* number for x everywhere it appears in an expression or equation. For instance, if $f(x) = x^2 + 3x + 11$, and you substitute, say, 5 for x, you must write $f(5) = 5^2 + 3(5) + 11$, putting in 5 each place x appears.

Although "Applications" appears in each title, the books are designed to convey the structure of mathematics. Unlike some texts where the mathematics is introduced to solve an application problem, mine are *mathematics* texts with applications. They are not just *applications* texts with mathematics. My experience in nuclear propulsion made me realize that understanding theory is necessary for making intelligent applications. Briefly, to be able to think "outside the box," it helps to know what's *in* the box.

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