

INTRODUCTION TO A NEW IMPROVED QUADRATIC FORMULA FOR SOLVING QUADRATIC EQUATIONS.

This new improved formula to solve a quadratic equation in its standard form: $ax^2 + bx + c = 0$, was developed by Nghi H. Nguyen, a Vietnamese American civil engineer. This new formula is called by the author: “The quadratic formula in graphic form” and it gives the roots of a quadratic equation by this formula:

$$x_1 = \frac{-b}{2a} + \frac{d}{2a} \quad \text{and} \quad x_2 = \frac{-b}{2a} - \frac{d}{2a} \quad (1)$$

The quantity $(-b/2a)$ represents the x-coordinate of the axis of the parabola that is the graph of the related quadratic equation.

The quantities $(+d/2a)$ and $(-d/2a)$ represent the two distances from the axis of the parabola to the 2 x-intercepts of the parabola.

The value d can be zero or a real, radical, or imaginary number that will translate to a double root, two real roots, or 2 imaginary roots.

The quantity d can be easily computed from the relation about the product of the two roots: $x_1 \cdot x_2 = c/a$. It then gives: $d^2 = b^2 - 4ac$. (2)

To solve a quadratic equation, first compute the value of d by using the relation (2) then find the roots by using the formula (1).

Compared to the classic quadratic formula, this new improved one is simpler and easier to remember since students can relate it to the graphic interpretation of the real roots. In addition, the quantities $(d/2a)$ and $(-d/2a)$ make more sense, about distances, than the quantity containing the square root of the quantity $D = b^2 - 4ac$.

The quadratic formula must be used whenever the given quadratic equation can not be factored into two binomials in x . If the equation is factorable, there is a new method, called The Diagonal Sum Method, that can directly give the 2 real roots without factoring. This new method was developed by Nghi H Nguyen, co-authored with two San Jose, California American math teachers, Karen Kusanovich and Wendy Lawson. The new math method was explained and presented in the new math text book titled:

“New methods for solving quadratic equations and inequalities” (Trafford Publishing 2009). You can find it by searching the net on Google.com, Bookfinder4you.com, or Campusi.com.

In existing algebra math books, there are two common methods to solve a quadratic equation in its standard form $ax^2 + bx + c = 0$. The first method uses the quadratic formula when the given equation is not factorable. The second method solves the equation by using the trial-and-error factoring method. To factor a quadratic equation, students have to guess and try the values of four terms m, n, p, q , in two binomials in x : $(mx + n)(px + q) = 0$. Practically, most of the students feel uncomfortable in finding the

right terms after successive trial-and-errors, because there are many permutations involved.

The new “Diagonal Sum Method” uses an **innovative concept**, not developed in other math books, that is direct finding two real roots, in the form of 2 fractions, knowing their sum $(-b/a)$ and their product (c/a) . The book sets up easy instructional steps for a student, with average mental math ability, to be able to solve a quadratic equation quickly. This method offers the advantage of directly obtaining the 2 real roots of the quadratic equation, without having to factor it. It is a trial and error method, same as the factoring one, but it reduces the number of permutations in half by using a Rule of Signs for Real Roots, that shows in advance the signs of the 2 real roots (+ or -) before proceeding.

Besides the new math method in solving quadratic equations, the authors also introduce two new math methods in solving inequalities in one variable. The new methods are presented in two math textbooks recently published and titled:

“Linear equations, inequalities, and functions” (Trafford.com)

“Trigonometry: Solving trigonometric equations and inequalities” (Trafford.com)

These three new math books mentioned above are being sold online at the publisher’s website and on Amazon.com. To find them, log into the publisher website, Amazon.com, Yahoo or Google, then type in the author’s name or the book’s title.

The first new method for solving a system of linear/quadratic inequalities in one variable introduces an innovative **number line** technique. The existing method, taught in worldwide high school algebra classes, tells students to hi-light the combined solution set of both inequalities on the **same** number line by drawing confusing cross marks in two different directions. The new method, using a **double number line** and separately plotting each solution set on its given number line, will help students easily visualize the combined solution set of the system through superimposing technique. A **triple number line** may be used to find the combined solution of a system of three inequalities.

The second new method introduces **graphing of functions** by graphing calculators as an educated way for solving any inequalities and systems of inequalities. Graphic methods have always been more convenient than algebraic methods in math problem solving since students can visualize the solution. In this direction, the books develop a graphic method to solve any inequalities and systems of inequalities in one variable by considering the relative position of the function’s graph with respect to the x-axis. The consequence of this innovative method is amazingly useful. High school students, after learning this approach and with the help of graphing calculators, will be able to solve various types of inequalities and complex systems of inequalities in one variable much more easily than using algebraic manipulation. Besides linear and quadratic forms, various inequalities in one variable may include cubic, bi-quadratic, rational, radical, exponential and **trigonometric inequalities**. This new method that consists of reading graphs, analysis and making conclusions would fulfill the true purpose of high school math teaching./.