

The right way to conduct a serious test of the validity of my proposition that four specified numbers comprise a "Magic Foursome" of numbers of exceptional significance in mathematics and physics in the real, physical universe, not readily confirmed by use of a mathematical calculator that employs a "math co-processor"

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THE ESSENCE OF MY DISCOVERY IN 2025

WHICH I LIKE TO CALL "THE MAGIC FOURSOME"

My discovery was and is the discovery of the role that the rational number $(47/45)$, or $(4.7/4.5)$, $= 1.044444444$ plays in the unique relationship of the four numbers:

- | | | | |
|----------------|-----------|----------------|------------|
| 1) 1.044444444 | $(47/45)$ | 2) 1.414213562 | $\sqrt{2}$ |
| 3) 2.618033989 | Φ^2 | 4) 3.141592654 | π |

Look closely at the proposed relationships among these four numerical values:

$\Phi^2 = 2.618033989$, $\sqrt{2} = 1.414213562$, $\pi = 3.141592654$, and now the new information we have added is the number $(47/45)$ or $(4.7/4.5) = 1.044444444$:

$$\frac{47}{45} * \frac{\sqrt{2}}{\Phi^2} = \frac{1}{\sqrt{\pi}} = 1.044444444 * \frac{1.414213562}{2.618033989} = 0.5641895807$$

$$\text{If } R = X * \frac{\sqrt{2}}{\Phi^2} * \frac{47}{45} = \text{then } R = \frac{X}{\sqrt{\pi}} \text{ and } \pi * R^2 = X^2 \text{ correct [AC = AS]}$$

$$\frac{45}{47} * \frac{\Phi^2}{\sqrt{2}} = \sqrt{\pi} \quad \text{correct} \quad [1]$$

$$\frac{\Phi^2}{\sqrt{\pi}} * \frac{1}{\sqrt{2}} = \frac{47}{45} \quad \text{correct} \quad [2]$$

$$\frac{\sqrt{\pi}}{\Phi^2} * \sqrt{2} = \frac{45}{47} \quad \text{correct} \quad [3]$$

$$\frac{45^2}{47^2} * \Phi^4 = 2 * \pi \quad \text{correct} \quad [4]$$

The problem for mathematicians and physicists is that a mathematical calculator does not verify these relationships "exactly" but result in slightly different decimal values when "tested" with a calculator.

For example, let's label the numbers resulting from the proposed "Magic Foursome" with the notation of [ma] and the outcome of computations completed by an electronic calculator with the notation [ec].

The kind of outcomes we get when we test the "Magic Foursome" equations is generally as follows: The outcome of 0.5641895807 [ma] divided by 0.564189835 [ec] = 0.999999995 instead of 1.000000000 "exactly." Why is that?

When we test the equation #4 above [4], the outcome value for $\pi = 3.141592685$ [ma], and that computed value divided by the π value built into the calculator, which is 3.141592654, = 1.000000001 instead of 1.000000000 "exactly." Why is that?

The reason for these "not exactly" discrepancies is generally due to the limits of the electronic calculator, or "math co-processor" that employs electrical current to represent a binary number system and complete binary calculations by application of the two possible conditions of an electrical current (0) off and (1) on. Every calculator therefore is a human artifact, a machine made by human hands and human technology that can serve its intended purpose only by converting decimal digital numbers to binary numbers, complete the "processing" of the binary computation, and then convert back to decimal.

This so far is a very general answer to the question why a test of the "Magic Foursome" appears to invalidate the proposition that the equations listed above are exactly correct in the real, physical universe. But there is more. To seriously test the "Magic Foursome" proposition requires much more detailed probing, more specific questions, and more detailed and specific explanations about how numerical computations are rendered by the machine that we call "a calculator."

For example, continue to take the Magic Foursome proposition seriously by asking "What is a math co-processor?" Here immediately below are some explanatory responses to What is a math co-processor? And later, I will point to some more specific questions that must be asked and answered to understand that the calculator processing of the "Magic Foursome" equations is less precise than the calculations completed by "Nature" in the real, physical universe. While I expand my concept of a serious test for the "Magic Foursome," we are also exploring, seriously, why calculator output is "not exact."

From online sources, including AI, HI, and CPU:

A **math co-processor** – also called a numeric co-processor or a **floating-point unit (FPU)** – is a specialized processor chip or circuit designed to handle complex decimal and floating-point math calculations much faster than a standard central processing unit (CPU). Note what "floating-point" means:

A floating-point number is a computer data type used to represent real numbers that have fractional parts (such as 3.14159 or -0.0125) by dynamically shifting ("floating") the decimal or binary point. In plain language, by moving the decimal point, which means changing the level of precision. For example: 1.234567 is more precise than 123456.7 because 1.234567 needs to be precise to the sixth decimal place in order to be "exact," but 123456.7 only needs to be precise to the first decimal place to be "exact." This is the first key to what is really happening when a calculator does not render the outcome of the "Magic Foursome" equations "exactly."

How it works: (I freely acknowledge that this information is lifted from the internet or Google-world, the "Encyclopedia Britannica" of the twenty-first century.)

Scientific Notation in Binary: Instead of storing numbers as fixed whole integers, computers [calculators] store them similarly to scientific notation, such as $(1.44 * 10^3)$.

The Three Components: [This is essentially a non-technical description of computer engineering] Standardized by the IEEE 754 format, a floating-point number is broken down into three main binary parts: [IEEE means Institute of Electrical and Electronics Engineers.]

1) Sign Bit: Tells whether the number is positive or negative (0 for positive, 1 for negative).

2) Exponent: Scales the magnitude or size of the number (the power to which the base is raised).

3) Significand (or Mantissa): Holds the actual digits/precision of the number. This is the precision level accomplished by the electronic engineering of the computer chip, a limitation of the machine that limits the decimal precision of the calculation that the calculator can complete electro-mechanically. No commentary on the numerical outcome of the calculation that exists in the real, physical universe is intended. To fully appreciate the impact of the calculator "machine" refer to history: when electro-mechanical calculators were new (Alan Turing, 1935-1940s), the components in your hand held calculator filled an average size room and overheated.

IMPORTANT NOTE: The precision level IS NOT the number of digits that a computer or calculator *prints* as its output. The standard home computer will print 29 or 30 digits, but those digits are essentially NOT EXACT. The EXACT quality applies only to the level of precision built into the processing chip by the engineers – usually the eighth or ninth decimal place. If anyone is really concerned with the exactness of a calculator generated number, then they need to rewrite 1.234567837375656 etc. as 1.2345678 dash 37375656 etc. which tells them that the 1.2345678 is "exact" but the digits that follow- 37375656 etc. could be correct (exact) or not correct (not exact). Further! The not exact part of a complex calculator output can appear anywhere in the decimal part of the numerical output. See below a statement about the limitations of an electro-mechanical calculator. This is the source of the output of the Magic Foursome equations being "not exact." To be honest in an assessment of the Magic Foursome, a serious mathematician must acknowledge that although our calculators print out a decimal output that is "not exact," the equations can be 100% entirely correct, but beyond the precision level of the machine we call a "calculator." As follows from AI, HI, and CPU:

Key Limitations, rounding errors: Because computers store numbers in base-2 (binary) rather than base-10 (decimal) many everyday decimal fractions (like 0.1 or 0.2) cannot be

represented [printed output] with 100% exactness. This can lead to tiny rounding inaccuracies during math operations, for example, $0.1 + 0.2$ sometimes resulting in a printed output rendered as 0.300000000005. An objective mathematician can admit that this output is both correct and not exact if we acknowledge that the 5 is a result of the limitations of the machine (hardware) and the program (software). ***THIS IS THE BEST ITEM OF EVIDENCE THAT THE "MAGIC FOURSOME" IS MOST LIKELY CORRECT "EXACTLY" BUT NOT OUTPUT EXACTLY BY AN EMC.***

WHAT IS THE TRUE SOURCE OF THE "REJECTION" OF THE MAGIC FOURSOME? THE EXACT ANSWER IS THE SOURCE IS A DOCTRINE. A "doctrine" being a belief that has been elevated beyond question or beyond further discussion or objective examination. We know we have political doctrines and religious doctrines. Scientists are defensive and visibly upset whenever they hear a suggestion that science also has scientific doctrines, meaning a belief of scientists that has been elevated by the institution of science, or mathematics, above question. This is wrong of course, because anyone who studies the history of science can state with 100% exactness that the essence of science (and math) is revision. The science of the past was believed but is discredited by research, that wonderful word that means "to look again."

The specific doctrine is the doctrine that we cannot "square the circle," or, there is no way we can construct the numerical value of pi as a straight line using the compass and straightedge. The Magic Foursome refutes this ancient doctrine, and that is why the mathematicians reject it. Revision of an institutional doctrine is embarrassing to those who have defended that doctrine. Scientists do not like to acknowledge that science also has doctrines, similar to religion – VERY SIMILAR TO RELIGION.

There are a couple of more specific questions we can ask if we want to see the "not exact" quality of calculator output for the equations of the Magic Foursome.

More specific mathematical questions in regard to an electro-mechanical calculator (EMC):

1) How does an EMC produce an output to represent the value of Phi? Phi being the sum of the infinite series we call the Fibonacci Series?

2) How does an EMC create or establish the working value of pi, being the number which is apparently an infinite decimal that represents the circumference of a circle divided by its diameter?

3) How does an EMC find the output for $\sqrt{2}$ 1.414213562 which is a straight line from one corner of a square with Side =1 to the other?

(1) The Fibonacci series: is the decimal number system beginning with zero, followed by the next digit [or digits] with each "next number" being the sum of the last number added to the second to last number. For example 0,1,1,2,3,5,8,13,21,34,55,89,144 ... and on without a final term (*infinite* series). The Fibonacci sums or "terms" mean $0+1=1$, $1+1=2$, $2+1=3$, $3+2=5$, and so on. But that is not all. The sum of the infinite series, at any step, is the last summation divided by the second to the last summation: $2/1$, $3/2$, $5/3$, $8/5$, $13/8$, $21/13$, $34/21$ and so on, forever. And further, the sum of the infinite Fibonacci series appears to be equal "exactly" to 2 times the cosine of 36 degrees: $2 * 0.809016994 = 1.618033989$ this "not exact" number also known as the "Golden Section" or the "Golden Mean." THEREFORE, ask the question: "How do engineers chose the method or steps that will render the output of this *infinite series*? It is impossible for the rendered sum to be "exact" because no sum or an infinite series can be exact precisely because the infinite part of the series cannot be reached at any time before the mythical time we would have to call "the end

of infinity." Series of terms: 2, 1.5, 1.666666666, 1.6, 1.625, 1.615384, 1.619047, 1.617647058, 1.618181818... and so on. We can see what is happening now: each subsequent pair of terms (such as #8, #9) alternates between a sum slightly less than the "infinite" sum and slightly more than the "infinite" sum (1.617647058 and 1.618181818), and we do not arrive at a numerical output close to our ($2 * \cosine\ 36 = 1.618033989$) until we reach the 10th term: 1.61803399. Note also the special quality of the 9th term (1.618181818). It is equal to $89/55$, where $0.55 = 20/11$ and the inverse $(11/20) = 1.818181818$, then that "term" $* 1.2 (6/5) = 2.181818181$, and that term $* 1.2 = 2.618618618 (144/55)$ and that value times 1.2 yields the next term $= (864/275) = 3.141818181$. Does that not suggest the "Magic Foursome" might exist? And it might be discovered through an exhaustive search? NOTE THAT THE EMC VALUE OUTPUT FOR Phi, or 1.618033989 CAN NEVER BE "EXACT" BECAUSE NO MATTER WHAT THE ENGINEERS MAY DO, THIS INFINITE SUM CAN NEVER BE COMPLETED. AND, whatever the engineers may do, the value output for this number will always have a limited level of precision and never be "exact." That means that any expression that involves this value (Phi) or (Phi²) as a value added or subtracted or multiplied will not be "exact." Further, note that there is something inherently unique about the 1.2 value (6/5) which two digital values occur repeatedly in the natural world. Phi² or 2.618033989, times 1.2 = 3.141640786. And that value divided by the value for pi in an EMC = 1.000015321, which I call "MQ." MQ is unique because: $MQ = 1.000015321$, and $MQ * 2 = MQ^2 + 1$; $(MQ + 1) / 2 = \sqrt{MQ}$; and $MQ + 1/MQ = 2 (1.000015321 + 0.999984679)$. One item in support of the exhaustive quality of my numerical research. MQ is another calculator output that can never be "exact."

Similar discussions follow from a reasonable examination of how an EMC obtains (outputs) a value for pi and for the square root of two.

THEREFORE, the question of importance is not whether any of these expressions discovered employing the numbers of the "Magic Foursome" are "exact." Of course they are not "exact" in the sense that the decimal digits are perfectly correct too the 100th decimal place or even the 7th decimal place. The numbers involved pass through the EMC process of converting decimal to binary and then back to decimal one or more times. Where is there an electronic engineer, or a team of members of the IEEE, who can name and explain the reasons why the numerical values output from the expressions of the Magic Foursome ***are most likely correct?*** What is required to do this? Competence? Courage? Or both?