All values of trigonometric functions

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Maximum and minimum values of all trigonometric functions. Find the values of all six trigonometric functions calculator. Find the value of all trigonometric functions of 135^(@). 2.find the values of all trigonometric functions of 135^(@). Find the value of all trigonometric functions of 135 degree. Find the values of all six trigonometric functions of the angle. Values of trigonometric functions for all angles. Find the values of all six trigonometric functions.

This page is about the trigonometric functions of sine, cosine and tangent, what they are and how to find the exact values of many angles. Calculators and other effects on this page requires Javascript but it seems to have JavaScript switched off (is disabled) in this browser. Please go to the Preferences menu or item for this Property browser and enable it and then reload this page. What angles have an exact expression for their Sines, cosines and tangents? You might know that cos (60 Â °) = 1/2 and sin (60 Â °) = 3/2 and tan (45 Â °) = 1, but they are 30, 45 and 60 only the angles of up to 90A Â ° with a formula for their trigonometric values? No! There are a lot more, but not all of the angles are the exact expressions involving other than square roots. What angles do? What models are there in these expressions? This page shows the expressions for many corners and even solves the complete problem of which angles do and who do not have these exact trigonometric expressions. which they are expressible as simple terms involving square roots. cos (a) sin (b) tan (a) cradle (b) radiating b radiansÃ Â ° Â Â ° 0 01 0 90 2 24 7.5 The `blue {} {(sqrt (2 + sqrt (2 + sqrt 3))) / 2} `` color {blue} {sqrt 6 - sqrt 3 + sqrt 2-2} `` color {blue} {= (sqrt 2-1) (sqrt 3 - sqrt 2)} ` 82.5 11 I 24 I 12 15 `blue color {} {(sqrt sqrt 6 + 2) / 4 = sqrt (1/2 + (sqrt 3) / 4) = sqrt ((4+ sqrt 12) / 8)}` `blue color-sqrt {2} {3}` 75 5 The 12 cos2 (15 Â °) = [0; 1.13, 1.12] tan (15 Â °) = [0; 3, 1, 2] tan2 (15 Â °) = [0; 13, 1, 12] 10 18 `blue color {} {sqrt (10 + 2 sqrt 5) / 4 = sqrt ((5 + sqrt 5) / 8)}` `blue color {} {sqrt (1- (2 sqrt 5) / 5)}` `72 2 5 cos2 (18 Â °) = [0; 1, 9, 2, 8] tan2 (18 Â °) = [0; 9, 2.8] 8 22.5 The `blue {} {(sqrt (sqrt 2 + 2)) / 2 = sqrt ((sqrt 4 + 8) / 8)}` `color {blue} {sqrt 2-1 } `67.5 3 8 cos2 (22.5Ã Â °) = [0; 1, 5, 1, 4] tan (22.5Ã Â °) = [0; 2] tan2 (22.5Ã Â °) = [0; 5, 1, 4] 6 30 `blue color {} {(sqrt 3) / 2}` `blue color {} {(sqrt 3) / 3}` 60 I 3 cos (30 Â °) = [0; 1, 6, 2, 6] cos2 (30 Â °) = [0; 1, 3] tan (30 Â °) = [0; 1, 1, 2] tan2 (30 Â °) = [0; 3] 5 36 `blue color {} {(sqrt 5 + 1) / 4 = sqrt ((3 + sqrt 5) / 8)}` `blue color {} {sqrt (5 - 2 sqrt 5)}` 54 3 I 10 cos (36a Â °) = [0; 1, 4] cos2 (36a Â °) = [0; 1, 1, 1, 8, 2] tan2 (36a Â °) = [0; 1, 1, 8, 2] 5 The 24 37.5 `blue {} {sqrt (2 + sqrt (2-3 sqrt)) / 2} {` `blue} {sqrt 6 + sqrt 3 - sqrt 2-2 } `` blue color {} {= (sqrt 2 + 1) (sqrt 3 - sqrt 2)} `52.5 7 24 4 I 45` blue color sqrt {} {2/2}` `blue color {1} { } `45 I 4 cos (45 Â °) = [0; 1, 2] cos2 (45 Â °) = [0; 2] 7 24 52.5 `blue {} {(sqrt (2 - sqrt (2-3 sqrt))) / 2} {` `blue} {sqrt 6 - sqrt 3 - sqrt 2 + 2}` `color blue {} {= (sqrt 2 - 1) (3 + sqrt sqrt 2)} `37.5 5 I 24 3 I 10 54` blue color {} {(sqrt (10 - 2 sqrt 5)) / 4 = sqrt ((5 - sqrt 5) / 8)} `` blue {} {sqrt ((2 + 5 sqrt 5) / 5)} `36 The 5 cos 2 (54a Â °) = [0; 2, 1, 8, 2] tan2 (54a Â °) = [1; 1, 8, 2] 3 60 Blue {} {1/2 `` blue color}} {3} sqrt` 30 i 60 Â °) = [0; 2] cos2 (0 eorm) = [0; 4] tan (0Â0Â0Â) = [1; 1, 2] Tan2 (30.0.5 `blue color} {sqrt ((4-sqrt ((4-sqrt 8) / 8)` `colored blue {} {1 + sqrt 2} `22.5 i 8 cos2 (67.5ã, eorge) = [ 6, 1, 4] Tan (67.5 Â ° = [2; 2] Tania2 (675 termÂ ° = [5; 1, 4] 2 £ 1 72 `colored} {(sqrt ((3-sqrt 5) / 8)` `colored}}}}}}}}}}}}}}}}}}}} 2 sqrt 5)} `18 a â ory â,,¬ (72 Â ° = [0; 3, 4] Cos2 (72Â °) = [0; 10, 2, 8] Tan2 (72Â ° 02. [9; 2, 8] 5 ¯1 75 `color} {(sqrt 2) / sqrt (1/2 - sqrt ((4 - sqrt ((4 - sqrt 12))} `colored {blue} {2 + sqrt 3}` `ão` `` `` `` `` `` `` `` `` `` `` `` `` `` `` `` a,¬ 12 cos2 (75 Â °) = 14, 1, 12] tan (7 7 7 7 75 years) = 1, 2] Tan2 (75 Â °) = [13; 1, 12] 11 yy 0 825 `colored} {sqrt (2))) / 2` `color}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}} + 2} `colored}} (sqrt 2 + 1)}}}` `ão` ão ão ão ão ão ão ão ão il ão il } {0} `` colored {blue} {o o oh} `0 0 The fraction continue [a; B, C, D, ...] Is a stationed notation for a + 1 b + 1 c + 1 d + and the continuous fraction of the periodic [a; B, C E Ã Île Ethween, Ethank-, ...] is forming as [a; B, C D, E] Where's the Earlier Number and semo (;) ã the comma the whole part and the line over the numbers indicates the part of you are still running for the end. See an introduction allies continue. All trig functions in a diagram whenever a large large math demonstration of as all 6 trigonometric tasks are correlated, in a interactive diagram. Ecco Static you owe An oval a useful diagram: However âaGram ore to see what you are measuring Dalley, but don't provide any signs of signs of values. The signs are chosen to render the formula of the trig you see follow consistent for all angles. Also, the next section shows the graphic lor and dals of base seno base, all of each other follows. The SINE function has Many Mechanical Applications (Examples rolling items), electronic (Example Electrical Electrics and the Electrical Electric) Electrical Electrical), ... FURROUS ABOUT EACH OVERS OF RANGE 0 Â ° 90 Â ° Here is diagrams of an anglor of a circle of a circle of a circle, instantaneous as the trigonometry functions are correlate Dal Project Wolf Demon of C. Ormullion. Click a quadrant to see a typical angle and all the functions of 6 trig. Ecco another views, graphics dai: a belonging to use the signs in any Ã ca.S.9 (0-90 Ã,90) but no squares, one's only one of sin, cos or tan ãa positive other quadrants: can you see you than a large shaped and the only function (s) that hai the soda values in Ã Ã Ã Ã Ãy. In the side-handled seno, held, teenage, co-tangent, coso 'beside with the rack "all the cups from tires." But perchãum not creating your sentence to remember the astc letters? If I unpitrao, that is the occine ink! Once you reminded the bill for these three functions, we can use it a sign in the loro reciprocal coscental, secant and cotangent. The basic formulas here all the answers on the sine graph as follows: the sine of an angle is defined by the from Height of a point while revolving around a unit circle (ie its radius is 1) measured by a horizontal line through the center of the circle. So it can't be bigger than 1 or less of -1. The corner of a corner is defined by the horizontal distance of a point as it rotates around the unit circle measured by a vertical line through the center of the circle. Even in the field from -1 to 1. From the diagram it is easy to see that the graphs sine and so are the same shape, but moved from a quarter of a turn (90Ã °). In mathematical terms, let's say so (x) = Sine (90Ã ° + X). The tangent of a corner measures the relationship of Sine to cosine and so can take any value. At 90 ° multiples becomes infinite or negatively infinite. Click on the diagram to go to the Mathematica Demonstrations website for the free version Computable Document Format (CDF) playing in a free CDF player and makes the animation live. The Spinning Out Sine and Cosine demonstration is B Atwood and S Wagon. The corners can be measured by different types of units. Often this is degrees with a complete turned ride in 360 degrees if they define sine and though from distances (or coordinates) of a point on a unit circle, we can also define the angle from a distance on that circle too: the distance on the Circumference that a point travels in harmony through that corner. The circumference of a unit circle is 2 ï €. This measure is called Radian. Here is a converter to convert between the two: Patterns The simple square-rot model Ernesto The Ornen of Madrid has indicated the following clean mode to connect and remember the simplest of the Sines (Cosines): Â ° Radcosina SineÂ ° Rad 0090ï € 2 30ï € 660ï € 3 45ï € 445ï € 4 60ï € 330 ï € 6 90ï € 200 The model ÂŠ2 Â âšn Ernesto The Orden has also put many corners in this model: COSNI SINE ï € 290ÂÂ ° 0 5ï € 1275Â ° 15 3 € 867.5Â ° 22.5 ï € 360Â ° 30 ï € 445Â ° 45 ï € 630Â ° 60 ï € 822.5Â ° 67.5 ï € 1215Â ° 75 00Â ° 90 âš2 Â ± The model of this type is 2ï € 572Â ° Color {blue} {frac {sqrt {2 - phi}} {2} 18Â ° 3} € 1054Â ° Color {blue} {frac {sqrt {2 - varphi} } {2} 36 ° ï € 536Â ° Color {blue} {frac {2} {2} * (in English) The gold ratio \\\\\\\\\\\\\\\ \\ \\ \\\ \\\ varphi}}}}}}}} = Ï € / 5) = ` or {blue} {frac {1} {2} sqrt {2 + sqrt {2 - phi}} = ♪ Is there a more understanding reason here if we use all the following values under the inner square:` \ color {blu} {2, \ sqrt {3}, \ Phi, 1, \ Varphi, 0, - \ Varfi, -1, - \ sqrt {3}, - \ sqrt {3}, - phi, -2} `o 2, 1.732 ..., 1.618 ..., 0.618 . The model continues with the socks of 4.5 °, 13.5 °, etc. semplici semplici semplici - This triangle is only square cut along a diagonal. If the sides are of length 1, the diagonal is length âš2. This gives the sin, what and the tan of 45 °. Here is an equilateral triangle where all sides and all corners are equal (at 60 °). If the sides are of length 2, then, when we cut it in half as shown, the two triangles have 60 °, 30 ° and angles of 90 ° with one side of length 1 and a hypotenuse of length 2. The other side is therefore of length âš3. So we can read the sin COS and tan both 30 ° and 30 °. 36 ° and 54 °, 18 ° and 72 ° for 36 ° and 72 ° We need further work based onof a regular pentagon which has angles of 36 ° and 72 °. if the sides of the pentagon are of length 1, the diagonals are of the golden section number of the phi length where: phi = = 1.618033988 .. = â 1 + âš5â = 1 + â 12phi the upper triangle with angles 72 ° , 72 ° and 36 ° and sides of lengths 1, phi and phi show the values of the trig for 18 ° and 72 °. the lower triangle with corners36 Â °, 36 Â ° and 108 Â ° and sides of lengths 1, 1 and Phi show the values of the trig of 36 Â ° and 54 Â °. 15 Â ° E 75 Â ° If we take the triangle to the left, we can calculate the length of the third side using the formula of the cosine. If, in a triangle with sides A, B and C, we know both sides B ECE also the angle between the sides B and C, so we can calculate the length of the third side, A, as follows: A2 = B2 + C2 Ã ¢ â,¬ "2 bc so (a) for our triangle on the left, the known sides are b = 2 ec = 2 and the angle between them is a = 30 Â °. The length of the third side , the base a, is therefore: a2 = 22 + 22 Ã ¢ â,¬ "2 x 2 x 2 x so (30 Â °) = 8 Ã ¢ â,¬" 4 Ã ¢ Å¡3 = 2 (4 Ã ¢ â,¬ "2 Ã ¢ Å¡3) MA (Ã ¢ Å¡3 Ã ¢ â,¬ "1) 2 = 3 + 1 Ã ¢ â,¬ "2 Ã ¢ Å¡3 = 4 Ã ¢ Å , ¬ "2 Ã ¢ Å¡3 and so A2 = 2 (Ã ¢ Å¡3 Ã ¢ â,¬ "1) 2 Taking the square root: A = Ã ¢ Å¡2 (Ã ¢ Å¡3 Ã ¢ â,¬ "1) that we can also write as = 2 (Ã ¢ Å¡3 Ã ¢ â,¬ "1) / Ã ¢ Å¡ 2 Using these expressions for A, we can expand the triangle of a factor of Ã ¢ Å ¡2, to get rid of the denominator. Finally, we put in a line from the top of the triangle to the center of the base to make two triangles on the right. This will halve the A side and cut the triangle in two and also get rid of the factor 2. We then arrive at the triangle on the right showing the sines and the little corners of 75 Â ° and 15 Â °: Rectangle of Ailles for 15 Â ° and 75 Â ° An alternative method (easier) for breast and cosine of 15 Â ° and 75 Â ° is located in Rectangle Alles (with a name after a Teacher of High School of Ontario). It is easy to remember because it is two triangles on the right from 45 ° to 45 Â ° attached to the sides of a white triangle 30 Â ° -60 Â ° -90 Â ° -90 Â ° and the rectangle completed with a Yellow triangle 15 Â ° -75 Â ° -90 Â ° -90 Â ° ompotenusa del triangle 30 Â ° -60 Â ° -90 Â ° -90 Â ° as shown here. The sides from 30 Â ° -60 Â ° -90 Â ° -90 Â ° are "as usual", ie 1, 2 and Ã ¢ Å¡3. From the two triangles from 45 ° -45 Â ° -90 Â ° -90 Â °, it is quite easy to see that "x` is color {blue} {sqrt 3 / sqrt 2} is y` ¨ `{blue} {1 / sqrt 2}` from which we can read the sines and the 16th and 75 Â ° sines. However we will take some more beautiful numbers on the triangles if we expand all the sides of a factor Å¡2. Click on the buttons below the image to see the dimensions (expanded). Many symmetries and models are obvious in the table. They reflect some identity below like: `sin (x) = a / h`` so (x) = b / h` "Cosec" (x) = h / a` "x) = h / b` tan (x) = a / b`.cot (x) = b / a` color { blue} {sin (x) = so (90 Â ° - x)} `Â, color {blue} {sin ^ 2 (x) + so ^ 2 (x) = 1}` `color {blue} {tan (x) = sin (x) / cos (x)} `Ã ¢` color {blue} {cot (x) = 1 / tan (x) = so (x) / sin (x)} `` ` {blue} {tan ^ 2 (x) + 1 = 1 / (so ^ 2 (x))} `Â, color {blue} {cot ^ 2 (x) + 1 = 1 / (sin ^ 2 (x))} `If we know the value of a trig function on two A ngoli "a` and` b`, we can determine the trig function values of their sum and difference using the following identities: `sin (a + b) = sin (a) cos (b) + cos (a) sin (b) `` COS (A + = COS (a) cos (b) -without (a) sin (B) 'is' \ colour {blue} {tan (a + b) = (Tan (A) + Tan (B)) / (1-Tan (a) Tan (B)) } " sin (ab) = sin (a) cos (b) -cos (a) sin (b) " cos (ab) = cos (a) cos (b) + sin (a) sin (B) ' If the two corners are the same (ie `a = b`) we get the sines and the little corner of the corner. Reorganizing those formulas give to the formula for sin or cosine of half angle: `color {blue} {sin (2a)}` `color {blue} {= 2sin (a) so (a)} Ã ¢` Color {blue} {sin (A / 2) = sqrt ((1-so (a)) / 2)} `` color {blue} {COS (2a) `` `color {blue} {= 1- 2Sin ^ 2 (a)} `` Color {blue} {COS (A / 2) = SQRT ((1 + COS (a)) / 2)} `` color {blue} {= so ^ 2 (a) -Sin ^ 2 (a)} `` color {blue} {= 2 so} {a) -1} `` color {blue} {2 csc (2a) = tan (a) + cradle (a) } `` color {blue} {tan (a / 2) = (1-so (a)) / sin (a) = sin (a) / (1 + cos (a))} `The following modification a product of trig functions in a sum or difference and vice versa: `color {blue} {sin (a) + sin (b)}` `color {blue} {= 2 so ((ab) / 2) sin ((a + B) / 2)} `Â, COS (a) + COS (b)` `" Blue} {= 2 COS ((AB) / 2) COS ((A + B) / 2)} ` `Sin (a) - sin (b)` `color {blue} {= 2 sin ((AB) / 2) COS ((A + b) / 2)}` `COS (b) - COS (a) `` {blue} {= 2 sin ((AB) / 2) sin ((a + b) / 2)} `a diagra MMA to relate many corners and the Phi Robert Gray page on the coordinates for many regular solids has an incredible diagram on the bottom that tells PHI at the corners of 18 Â °, 30 Â °, 3 6 Â °, 45 Â °, 54 Â °, 60 Â ° and 72 Â ° According to their 3D coordinates in solids. Each of those angles is measured by most circle circle when a vertical line turned through that corner. Each line of the base point meets the circle at a point whose height is 1 (72 Â °), 1 + Phi (60 Â °), 2 + Phi (54 Â °), 2 + 2 Phi (45 Â °), 2 + 3 Phi (36 Â °), 3 + 3 Phi (30 Â °) or 3 + 4 Phi (18 Â °). Watch its pages for more fascinating information on 120 3D solids, of which we will also explore the most symmetrical 5 on our next page. Make the math ... Suppose the origin of the circle is (0.0) and its radius is 2 + 2 Phi. Find the circle equation. Use your answer to the previous question to find the coordinates of each of the points on the circle with the angles shown. Computes the lengths of each of the red lines from the lowest point to the points shown on the circle. From any two points A and B on a circle, the AOB angle at the center of a circle, or, is double the corner at any point of the circumference in the same sector. In the diagram, all the red corners of the circumference are the same; The red corners are half of the blue AOB angle in the center; The red corners are at one point in the same sector as the circle as the center of the circle so that they cannot be in the gray sector. Use the theorem up to find three points on the circle of Robert Gray immediately before this "Make the math ..." Section where a line from the center makes angle with the vertical of 2- 18 = 36 Â ° 2-30 = 60 Â ° 2- 36 = 72 Â ° Are there any other angles with a simple exact expression for their cosine or breast? Well, it all depends on You mean by simple! Carl Friedrich Gauss (177 - 1855) looked at a similar problem that answers this question. He investigated whether there was a method to build a regular polygon of the sides n using only a pair of compasses (to draw circles) and a straight edge (a ruler with no noWe know we can build a regular polygon for all values of n = 3, 4, 5, 6, 8 and 10. Halving Câ is a simple geometric way to use compasses to divide an angle into two (bisozione dellâ angle). So all the corners of a regular n-gon can be divided into two to make a regular 2n-gon. We can repeat the process to get a 4n-gon, 8n-gon and generally a 2kn-gon for each k once we have a method to build a regular n-gon. The section of Trig Formula above contains a formula for the cosine of half angle in terms of cosine dellâ angle (full): '\ color {blue} {cos (A / 2) = sqrt ((1 + cos (A)) / 2) = (sqrt (2 + 2 cos (A))) / 2} 'How Mitch Wyatt pointed out to me, since we know that © cos (90 Ã Â °) and' 0 and 90 ° and ' 1/2 radians, we can use it to find the cosine of 'half of the angle (45 ° or Ã / 4 radians) and then halve respect of that angle and so' on. Every time we introduce unâ other square root we get a cascade sequence or nested square roots: '\ color {blue} {cos (pi / 4)}' = '\ color {blue} {(sqrt 2) / 2 } '' \ color {blue} {cos (pi / 8)} '=' \ color {blue} {(sqrt (2+ sqrt 2)) / 2} '' \ color {blue} {cos (pi / 16)} '=' \ color {blue} {(sqrt (2 + sqrt 2))) / 2} '' \ color {blue} {cos (pi / 32)} '=' \ color {blue} {(sqrt (2 + sqrt) qrt (2 + sqrt 2)))) / 2} 'However, this page is the sinusses and cosines who most simple expressions, so do not dwell there on this except to say that shows how we can always find unâ exact expression for the sine (or cosine) of â 1/2, 1/4, 1/8, ..., 1/2 ^ n 'of any angle for which we have an exact breast (or cosine) expression. Overlap If we construct a regular triangle (3 sides) and with the same center of circle, we construct three regular pentagons (5 sides) each having a vertex in common with the triangle, we will have 15 vertices of a regular 15gon. This is shown on the right with 3 pentagons blue on the same circle, each with a common vertex with the red triangle and the regular 15-gon appears in yellow. Overlaying two regular polygons such as this, we can build a PÂ Â Q-gon adjust (if P and Q have no common factors otherwise more than one vertex of each will coincide). All this was known to Euclid's time, around the year 300 BC. So, you say the seventh and ninth? And 'possible to find all the sines and cosines of multiples of 1/7 and 1/9 of a turn in exact terms (using square roots)? And the eleventh, the twelfth and so on.? Over the next 2000 years nobody found himself a precise geometric method of 7 or 9 goni, but no one had shown that it was impossible to build these regular polygons. Then CF Gauss completely solved the problem while he was a student at Göttingen between 1795 and 1798. Gauss found himself in the conditions of its prime factors equivalent to solve two problems: draw a regular polygon n-side using only a straight edge and a compass and express cos and sin of Using only square roots. If we atdain N as 2AP1BP2C ..., that is A, B, C, ... are the powers of the first factors of N: 2, P1, P2, ... (the power of the first is 0 if it is not aa of n) then both problems are solved when b,c,... and all powers except one, the power of 2, must be 1, and the first >2 which are factors of n (i.e. p1, p2, ...) must be of the form 22k+1 for a certain number k. Both problems are solved for these values of n and only for these values. The first numbers of the 22k+1 form are called Fermat prizes. The series of numbers of the form 22k+1 starts 220 + 1 = 3, 221 + 1 = 5, 222 + 1 = 17, 223 + 1 = 257, 224 + 1 = 65 537, ... However, not all the numbers of the form 22k + 1 are prime -- and it's only the prime numbers that we need to have as n factors. The next, 225 + 1 is 4 294 967 297 and it has a factor of 641 so it is not first. Actually, we don't know if there are any other primers of this shape, except for the first 5 listed above. These numbers, n, of the form Gauss describes are the following, one per row, each a product of some of the first Fermat (but every first at most) followed by its multiples of two. For any number in the table, its double is also in the table: 2 4 8 16 32 64 128 256 ... 3 6 12 24 48 96 192 ... 5 10 20 40 80 160 ... 3Â5=15 30 60 120 240 ... 17 68 136 272 ... 3Â17=51 102 204 408 ... 5Â17=85 170 340 680 ... 3Â5Â17=255 510 1020 2040 ... 257 514 When we're in order, we have (1), 2, 3, 4, 5, 6, 10, 12, 15, 16, 17, 20, 24, 30, 32, 34, 40, 48, 51, 60, 64, 68, 80, 85, 96, 102... which is Sloane's A003 401. Odd terms (left column in part 2) are series 1, 3, 5, 15, 17, 51, 85, 255, 257, 771, 1285, 3855, 4369, 13 107, 21 845, 65 535, 65 537, 196 611, 327 685, 983 055, 1 114 129, 3 342 387, 5 570 645, 16 711 935, 16 843 009, 505 290 which is A045 544 since we do not know more Fermat prime beyond the fifth (65 537). Some interesting facts about these odd numbers (let's also include 1 here) are: all these 31 odd numbers are divisors of 225â1 = 232 â 1 = 4 294 967 295 (see A004 729) When written in binary they are all palindromic (they are exactly the same when inverted). If we continue the model, regardless of whether 22kâ1 is first or not, what we find is the model of the Sierpinski Triangle. This is a fractal version – smaller of itself are contained in all the larger versions. One way to form it is to imagine the parity (probability and uniqueness) of numbers in Pascal's Triangle where every odd number in Pascal's triangle is represented by a black square and every even number by a white one: In Pascal's Triangle, we can start from a top row of 0's (white) with a single element of 1 (odd, black) in it. Then for the lines below we can use the rule that each element is generated by adding together the two elements on the line above: the one directly above and the one on the right. In the diagrams here we only want the parity of an element (if it is odd or even), so we have the simple rule that if both elements in the row above are the same color: either black Both white (also) the element will be White (also) If the two elements on the row above are different a strange one, one also the element is black (diseven) formula ï € / 17 the other small fraction of denominator that we have not covered yet is the only gauss has shown that Formula involving square roots, for socks and sines of multiple radials \ (\ frac {\ pi} {17} \). The formulas generated and simplified with Mathematicaâ® are still quite complicated. For example, here is \ (cos (\ frac {\ pi} {17})\)\ Color {Blue} {cos (PI/17)\ Color {Blue} {= SQRT (15 + SQRT 17 + SQRT (34 - 2 SQRT 17) + SQRT (68 + 12 SQRT 17 - 4 SQRT(170 + 38 SQRT 17)) Each of the four forms, A, B, C, D, is the sum or difference of the same two terms. We will use a + or - as a subscription for the sign used in each variation. (b) (b) (b)(b)(b)(b))(b)(b)(b)(b)(b)(b)(b))(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b))(b)(b)(b)(b)(b)(b)(b))(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b)(b))(b)(b))(b)(b))))(b)(b))(l)(l)(b)(b)(l)))(b)(The expressions For the Cosine and the multiple marks of angles ï € / 17 = 33.2639222145..-° up to 90 ° = ï € / 2 radiani are as follows: (a) (b) (b) (b)) (b) (b)) (b) (b) (b) (b) (b) (b) (c) (c) (d)) (d) (d)) (d) (d)) (d) (d) (d) (d) (d)) (d) (d)) (d) (d)) (d) (d) (d))) (d)) (d)) (d) (d) (d))) (d)) (d))) (d) (d) (d) (d) (d) (d) (d))) (d)) (d) (d) (d) (d) (d))) (d)))) (d)))))) (d) (d) (d) (d)))) (d) (d) (d) (d)) (d) (b) (b) (b) (b)) (b) (b)) (b) (b) (b) (b)) (b) (b)) (b) (b) (b) (b) (b) (d) (b)) (b) (d) (d) (d) (d) (d) (d)) (d) (d) (d) (d)) (d) (d)) (d) (d)) (d) (d) (d))) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d))) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d)))) (d)))))))) (d) (d) (d)))))) (d) (d) (d)))))) (d) `PHEW! The next value with an odd denominator is ï € / 257 and the exact expression for cos (ï € / 257) using square roots will be even more complicated! Tom Ace has emphasized that there is more about this in chapter 15 of the theory of the number of Oystein Ore and its history of 1948 and now available as Dover Book (1988). The formula ï / 15 if `color {blu} {a _(+) = 9 + sqrt 5}`````````` color {blu} {a _(-) = 9 - SQRT 5}` Color {blu} {blu} {b _(+ ) = SQRT (6 (5 + SQRT 5)}` color {blu} {B _(-) = SQRT (6-SQRT) `We have a 4COS2 (A) â€ 15` color {blue} {a _ (+) + b _ (-)} '2ï € 15` color {blu} {a _ (-) + _ (+)} `4Ã¨ â,¬ 15` color {blu} {a _ (+) - b _ (-)}` 7Ã¨ â,¬ 15` color {blue} {a _ (-) - b _ (+)} `a trig calculator using decimal numbers of any length here is a calculator that will allow you to check all the above results and more as more decimals as you want and evaluate expressions And find the continuous fractions. For example, to check the color {blue} {COS (PI / 17)} `Formula over the type in in To evaluate the input box and then press the convert button () and get its decimal value which is 0. For other values, such as "\ color {blue} {cos (PI / 8) }', type and evaluate it first as a decimal and then as a continuous fraction showing that the cf is [0; 1, 12, 7, 3, 2, 1, 1, 1, 20, 5, 3, 11, 1, 7, 3, ...]. Also forward for many other terms there is no pattern here. However, if we change the expression to evaluate the cf this time it is [0; 1, 5, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, ...]. There is a clear pattern here that happens for many terms. If we delete the 1,4,1,4, ... part and insert it into the input of the recurring part for the cf so that we have the cf [0; 1, 5, 1, 4] and then pressing the Convert-to-fraction-form () button will show '\ color {blue} { (2 + sqrt (2)) / 4}' as the value of 'cos (PI / 8) And so we deduce that (computationally) '\ color {blue} {cos (PI / 8) = SQRT (2 + SQRT (2)) / 2}'. In this way we can experimentally experiment many expressions of such expressions for the TRIG modules using the ability of this calculator to quickly evaluate to many decimal points and (accurately and accurately) convert the continuous fractions into the module ' (A \ PM SQRT (B)) / c'. So we can look for mathematical proof that our results are really true. Change the operating accuracy to 50, 100 or even 200 DPS to see if the models persist with greater computational accuracy. References 66.41 Some Trigonometric Relationships in Surd Form j m h peter the mathematical journal vol. 66, (1982), pages 296-299 Although there are some errors in its formulas involving˝" (our PHI) which are correct in the equations on this page. © 1996-2017 Dr Ron Knott was updated 30 MAY 2017 2017

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