I'm not a bot

This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources: "Algebraic expression" – news · newspapers · books · scholar · JSTOR (August 2024) (Learn how and when to remove this message) Mathematical expression using basic operations In mathematics, an algebraic expression is an expression built up from constants (usually, algebraic numbers), variables, and the basic algebraic operations: addition (+), subtraction (-), multiplication (×), division (÷), whole number powers, and roots (fractional powers).[1][2][3][better source needed]. For example, 3 x 2 − 2 x y + c {\displaystyle 3x^{2}-2xy+c} is an algebraic expression. Since taking the square root is the same as raising to the power 1/2, the following is also an algebraic expression: 1 − x 2 1 + x 2 {\displaystyle {\sqrt {\frac {1-x^{2}}{1+x^{2}}}}} An algebraic equation is an equation involving polynomials, for which algebraic expressions may be solutions. If you restrict your set of constants to be numbers, any algebraic expression can be called an arithmetic expression. However, algebraic expressions can be used on more abstract objects such as in Abstract algebra. If you restrict your constants to integers, the set of numbers that can be described with an algebraic expression are called Algebraic numbers.[contradictory] By contrast, transcendental numbers like π and e are not algebraic, since they are not derived from integer constants and algebraic operations. Usually, π is constructed as a geometric relationship, and the definition of e requires an infinite number of algebraic operations. More generally, expressions which are algebraically independent from their constants and/or variables are called transcendental. Algebra has its own terminology to describe parts of an expression: 1 – Exponent (power), 2 – coefficient, 3 – term, 4 – operator, 5 – constant, x , y {\displaystyle x,y} - variables By convention, letters at the beginning of the alphabet (e.g. a , b , c {\displaystyle a,b,c}) are typically used to represent constants, and those toward the end of the alphabet (e.g. x , y {\displaystyle x,y} and z {\displaystyle z}) are used to represent variables.[4] They are usually written in italics.[5] By convention, terms with the highest power (exponent), are written on the left, for example, x 2 {\displaystyle x^{2}} is written to the left of x {\displaystyle x} . When a coefficient is one, it is usually omitted (e.g. 1 x 2 {\displaystyle 1x^{2}} is written x 2 {\displaystyle x^{2}}).[6] Likewise when the exponent (power) is one, (e.g. 3 x 1 {\displaystyle 3x^{1}} is written 3 x {\displaystyle 3x}),[7] and, when the exponent is zero, the result is always 1 (e.g. 3 x 0 {\displaystyle 3x^{0}} is written 3 {\displaystyle 3} , since x 0 {\displaystyle x^{0}} is always 1 {\displaystyle 1}).[8] The roots of a polynomial expression of degree n, or equivalently the solutions of a polynomial equation, can always be written as algebraic expressions if n < 5 (see quadratic formula, cubic function, and quartic equation). Such a solution of an equation is called an algebraic solution. But the Abel–Ruffini theorem states that algebraic solutions do not exist for all such equations (just for some of them) if n ≥ {\displaystyle \geq } 5. See also: Rational function Given two polynomials P (x) {\displaystyle P(x)} and Q (x) {\displaystyle Q(x)} , their quotient is called a rational expression or simply rational fraction.[9][10][11] A rational expression P (x) Q (x) {\textstyle {\frac {P(x)}{Q(x)}}} is called proper if deg P (x) < deg Q (x) {\displaystyle \deg P(x)