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Естественный логарифм является логаритмом для базового е числа. Определение естественного логаритма Когда е у х X Затем базовый электронный логарифм х составляет ln (x) - журнал (x) - у Е константа или номер Euler: e ≈ 2.71828183 Ln как обратная функция экспоненциальной функции Естественная функция logarithm ln(x) является обратной функцией экспоненциальной функции ex. For x&gt;0, f (f -1(x)) = eln(x) = x Or f -1(f (x)) = ln(ex) = x Natural logarithm rules and properties Rule name Rule Example ln(x · y) = ln(x) + ln(y) ln(3 · 7) = ln(3) + ln(7) ln(x / y) = ln(x) - ln(y) ln(3 / 7) = ln(3) - ln(7) ln(x y) = y · ln(x) ln(28) = 8· ln(2) f (x) = ln(x) ⇒ f ' (x) = 1 / x  ∫ ln(x)dx = x · (ln(x) - 1) + C  ln(x) is undefined when x ≤ 0  ln(0) is undefined    ln(1) = 0  lim ln(x) = ∞ ,when x→ ∞  Euler's identity ln(-1) = iπ    Logarithm product rule The logarithm of the multiplication of x and y is the sum of logarithm of x and logarithm of y. logb(x · y) = logb(x) + logb(y) For example : журнал10 (3 No 7) - журнал 10 (3) - log10(7) Правило коэффициента Logarithm Логаритм деления х и у - это разница логаритма х и логаритма у. logb (х / у) - logb (х) - logb (у) Например: log10(3 / 7) - журнал 10 (3) - log10(7) Правило мощности logarithm логаритм х поднятый к силе у у времен logarithm х. logb (х у) - у q logb (х) Например: log10(28) - 8 журнал10(2) Производная естественного логаритма Производная функции естественного логаритма является взаимной функцией. Когда f (x) ln(x) Производная функции f(x) является: f' (x) 1 / х Интеграл естественного логаритма Неотъемлемой частью естественной функции логаритма является: logб f (x) ln (x) Интеграл f(x) является: ∫ f (x)d х х (ln(x) ∫ х (ln(x) - 1) - С Ln 0 Естественный логаритм нуля не определен: ln (0) не определен предел около 0 естественного логаритма х, когда х приближается к нулю, минус бесконечность: Ln 1 Естественный логаритм одного равна нулю: ln(1) й 0 Ln бесконечности Предел естественного логаритма бесконечности, когда х приближается бесконечность равна бесконечности: lim ln (х) ∞, когда х → ∞ сложный logarithm Для сложного числа z : z = reiθ = х + iy The complex logarithm will be (n = ...-2,-1,0,1,2,...): Log z = ln(r) + i(θ+2nπ) = ln(√(x2+y2)) + i·arctan(y/x)) Graph of ln(x) ln(x) is not defined for real non positive values of x : Natural logarithms table x ln x 0 undefined 0+ - ∞ 0.0001 -9.210340 0.001 -6.907755 0.01 -4.605170 0.1 - 2.302585 1 0 2 0.693147 e ≈ 2.7183 1 3 1.098612 4 1.386294 5 1.609438 6 1.791759 7 1.945910 8 2.079442 9 2.197225 10 2.302585 20 2.995732 30 3.401197 40 3.688879 50 3.912023 60 4.094345 70 4.248495 80 4.382027 90 4.499810 100 4.605170 200 5.298317 300 5.703782 400 5.991465 500 6.214608 600 6.396930 700 6.551080 800 6.684612 900 6.802395 1000 6.907755 10000 9.210340 Rules of logarithm ► See also If you're taking a high or a college math class, you probably cover natural magazines. But what are natural magazines? What is ln? Why does e keep popping up? Natural journals may seem difficult, but once you understand a few key natural rules of the journal, you can easily solve even very complex problems. In this guide, we will explain the four most important natural rules of logarithma, discuss other natural properties of the magazine that you should know, go through several examples of varying complexity and explain how natural journals differ from other logariths. What is ln? The natural journal, or ln, is the reverse e. The letter e is a mathematical constant, also known as a natural indicator. As π, e is a mathematical constant and has an established value. E is approximately 2.71828. e appears in many cases in mathematics, including scenarios about complex, growth equations, and decay equations. ln (x) is the time it takes to grow to x, whereas formerly this is the amount of growth, which occurred after the time x. Because e is used so commonly in mathematics and economics, and people in these fields often need to take logarithm with a number e base to allow a leveling or find value, a natural journal was created as a shortcut way to write and calculate the basis of e magazine. So ln(x) - magazine (x). For example, ln (5) - magazine (5) 1,609. 4 Key Rules of Natural Journal There are four basic rules that you should know when working with natural journals and you will see each of them over and over in your math tasks. Know this well because they can be misleading the first time you see them and you want to make sure that you have basic rules like these down solid before moving on to more difficult logarithm topics. Product rule ln(x) (y) ln(x) ln(y) Natural multiplication magazine x and y sum ln x and ln y. Example: ln (8) (6) - ln (8) - ln (6) Ln (x/y) - ln(x) - ln(x) - ln (y) Example: ln (7/4) - ln(7) - ln(4) Reciprocal Rule ln (1/x) th ln (x) The natural journal of mutual x is the opposite of ln x. Example: ln (1/3) - ln (3) Rule of power ln (xy) y y ln (x) Natural journal x raised to power y y times ln x. Example: ln (52) y 2 ln (5) Key natural properties of the magazine In addition to the four natural logarithm rules discussed above, there are also several properties ln you need to know if you study natural journals. Do these memorable, so you can quickly move on to the next step of the problem without wasting time trying to remember the common properties of ln. Scenario In Real Estate In number In negative number uncertain ln 0 ln (0) is uncertain ln 1 ln (1) 0 ln Infinity ln (∞ ∞) ∞) e raised to power x ln (ex) X e raised to ln eln power (x) X As you can see from the final three rows, ln (e) 1, and this is true even if one is raised to the power of the other. This is because ln and e are the reverse functions of each other. Natural Magazine Sample Problems Now is time to put your skills to the test and ensure you understand the ln rules by attaching them to example problems. Here are three sampling problems: Try to develop them on your own before you read through the explanation. Problem 1 Rate ln (72/5) First, we use the coefficient rule to get: ln (72) - ln(5). Next, we use the power rule to get: 2ln(7) -ln(5). If you don't have a calculator, you can leave an equation like this, or you can calculate the natural values of the log: 2 (1.946) - 1.609 and 3.891 - 1.609 and 2.283. Problem 2 Rate ln (e) /7 For this problem, we have to remember than ln (e) 1 Which means that the problem is simplified to 1/7, which is our answer Problem 3 Solve ln (5x-6) 2 When you have a few variables in ln brackets, you want to make e base and everything else indicator e. After that you get ln and e next to each other and as we know from the natural rules of the log, you want to make e base and everything else indicator e. After that you get ln and e next to each other and as we know from the natural rules of the log, you want to make an e base and everything else is an e. eln (x) x. Thus, the equation becomes eln (5x-6) 'e2 Since eln (x) ' x, eln (5x-6) 5x-6 So 5x-6 E2 e is permanent, you can figure out the value of e2, either by using the k key on the calculator or using e's score value 2.718. 5x-6 7.389 Now we'll add 6 to both sides of 5x' 13.389 Finally, we'll split the two sides into 5. x 2.678 How do natural magazines differ from other logarites? Recall that logarite is the opposite of power. If you take a log number, you cancel the metric. The key difference between natural journals and other logarites is the base used. Logarithms usually use a base of 10 (although this may be another value to be specified), while natural logs will always use the e base. This means ln(x)=loge(x) If you need to convert between logarithms and natural logs, use the following two equations: log10(x) = ln(x) / ln(10) ln(x) = log10(x) / log10(e) Other than the difference in the base (which is a big difference) the logarithm rules and the natural logarithm rules are the same: Logarithm Rules ln Rules log(xy)=log(x)+log(y) ln(x)(y)= ln(x)+ln(y) log(x/y)=log(x)–log(y) ln(x/y)=ln(x)–ln(y) log(xa)= alog(x) ln(xa)= aln(x) log(10x)= x ln(ex)= x 10log(x)= x eln(x)= x Summary: Natural Log Rules The natural log, or ln, is the inverse of e. Правила естественных журналов могут показаться нелогичнымые на первый but once you get to know them, they are pretty simple in memorable and applicable to practical problems. The four main ln rules are: ln (x) (y) - ln (x) ln (y) ln (x/y) - ln (x) - (y) ln (1/x) 'ln (x) ln (xy) - y'ln (x) The key difference between natural logs and other logarithms is the base used. What's next? Writing research work for but do not know what to write about? Our guide to research topics has over 100 themes in ten categories, so you can be sure to find the perfect theme for you. Want to know the fastest and easiest ways to convert between Fahrenheit and Celsius? We've got your back! Check out our guide to how to convert Celsius to Fahrenheit (or vice versa). Taking the SAT or ACT? Students often struggle the most with the math section of these tests, but check out our comprehensive guides to MATHEMATIC SAT and ACT Mathematics for everything you need to know to ace these math questions. Logarithmic function is a reverse exponential function. Logarith to base b is the force to which b must be raised to obtain this number. For example, log28 is the power to which 2 must be raised in order to produce 8. Obviously 23 and 8 so log28 and 3. In general, for b'gt; 0 and b is not equal to 1, some of the main properties of logarithms are listed below. These properties are known as cancellation equations because they allow you to simplify expresion to a single variable in certain situations. NOTE: By convention, logarithms to base 10 are simply referred to as natural log, since 10 is the most common base. For example, the log button on the calculator refers to logarites to the base 10. Examples of Logarithms Laws The following laws show how to calculate product logarithms, coefficient or exponential expression. For any a, x, y zgt; 0, where a is not equal and any real number r, two important facts that can be useful in logarimic calculations, is that logb1 and logbb No.1. Examples Note: For a complex example of expanding logarimic expression using logarim laws, see the question #1 in the Additional Examples section at the bottom of the page. As an example of the solution of logarimic expression, see #2. Natural logarithms Natural logarithm, designated ln rather than journal, logarithm with base e. Irrational e number equals 2.71828182828459... This number has important applications in calculus and the true meaning of it will be explained in the Derivatives section of Logarithmic Functions. At this point, this can be taken as a special number, which is approximately 2.718. The notation for natural logarithms is slightly different from notation for regular logarithms. Natural logarithm is equal to logarithma with base e. One of the special properties of natural logarithms is that of ln e No. 1. This property is easy to see because the ln e logarite form is an e log, which is always 1 for any variable. The definition of natural logarithms follows from the definition of regular logarithms, where the abolition of equations for natural logarithms also follow out of the property for regular logarithms. Laws of logarites can be applied to logarithms, allowing the base equal e. Below are the laws of natural logarits. For any x,y zgt; 0 and any real number r, Examples Note: For a complex example of a solution to logarimic expression, see the question #3 in the Additional Examples section at the bottom of the page. Changing the basic formula As mentioned earlier, calculators can only calculate logarits up to a base 10 or e. Changing the basic formula allows you to calculate the logarites of any base using our calculators. A general change in the basic formula states that this formula can be modified to convert between logarites and natural logarites. Examples 1 Expand logarithmic expression using logarith laws 2 Decide logaritic expression for x 3 Decide logaritic expression for x x using logarith laws Top of the page