

# DIFFERENSIAL TENGLAMALARINI YECHISHDA DASTURLAR MAJMUASIDAN FOYDALANISH

**<sup>1</sup>Эсанов Н. К. <sup>2</sup>Choriyev M., <sup>3</sup>O‘rolov O‘.A.**

**<sup>1</sup>Алфраганус университети, esanovnuriddin063@gmail.com**

**<sup>2</sup>TKTI “Oliy matematika” kafedrasiga tayanch doktoranti,**

**<sup>3</sup>TKTI “Oliy matematika” kafedrasiga stajyor tatqiqotchisi**

Tavarak atrofimizdagi har qanday harakat yoki sodir bo‘layotgan hodisa, albatta, biror qonuniyat, ya’ni funksiya asosida sodir bo‘ladi. Bu funksiyalar esa qandaydir tenglamalarning yechimlari hisoblanadi. Shu kabi oddiy ayrim oddiy differensial tenglamalar yaqin-yaqingacha asosan analitik usulda ishlab kelingan. Bu tenglamalarning umumiy va xususiy yechimlarni WolframAlpha dasturidan foydalanim ham olish mumkin.

1-misol. Koshi masalasini yeching:

$$\frac{2x dx}{x^2 - 1} + \frac{dy}{y^2} = 0.$$

O‘zgaruvchilari ajralgan differensial tenglama berilgan.  
Uni hadma-had integrallaymiz:

$$\int \frac{2x dx}{x^2 - 1} + \int \frac{dy}{y^2} = 0.$$

Bundan tenglamaning umumiy yechimini topamiz:

$$\ln|x^2 - 1| - \frac{1}{y} = C \text{ yoki } y = \frac{1}{\ln|x^2 - 1| - C}.$$

Dastlab kompyuterdagagi biror-bir internet brauzerining qidiruv sahifasiga wolframalpha buyrug‘i kiritiladi va kompyuter ekranida quyidagi oyna hosil bo‘ladi:



Enter what you want to calculate or know about

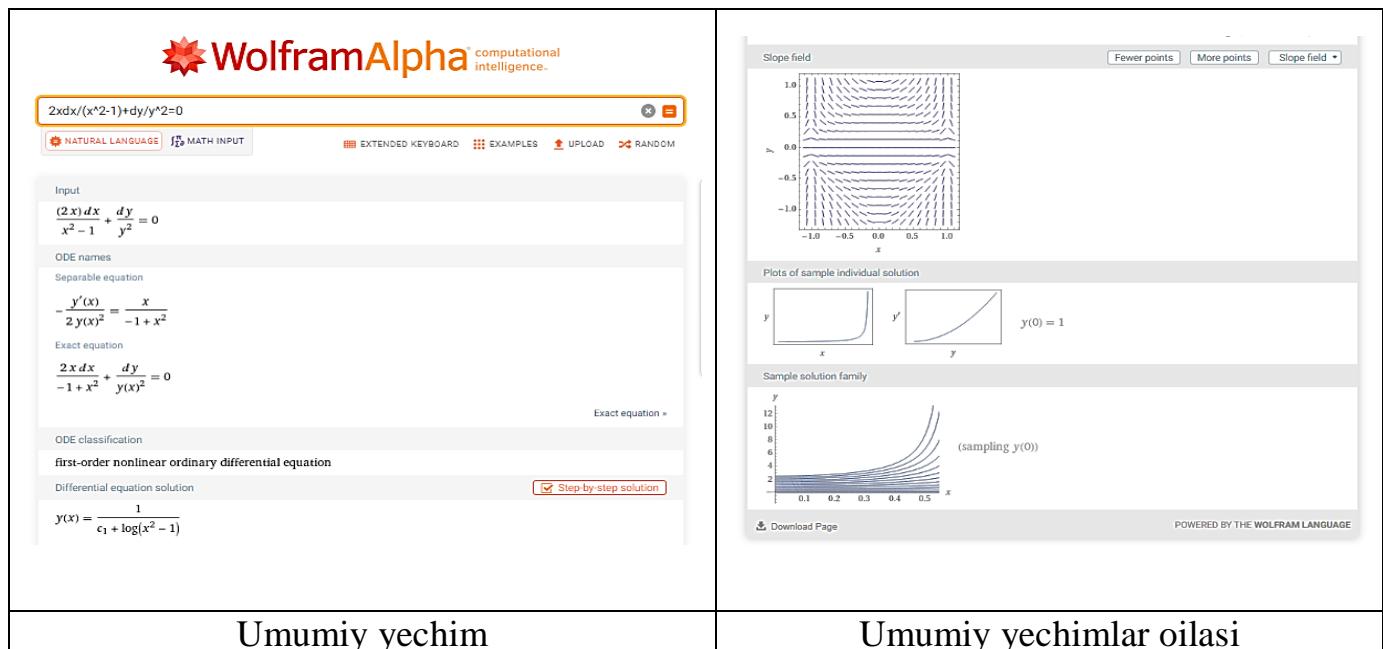
NATURAL LANGUAGE MATH INPUT EXTENDED KEYBOARD EXAMPLES UPLOAD RANDOM

Compute expert-level answers using Wolfram's breakthrough algorithms, knowledgebase and AI technology

Now Available through ChatGPT [PLUS]

Mathematics	Science & Technology	Society & Culture	Everyday Life
Step-by-Step Solutions	Units & Measures	People	Personal Health
Elementary Math	Physics	Arts & Media	Personal Finance
$x^2-1$ Algebra	Chemistry	Dates & Times	Surprises
Plotting & Graphics	Engineering	Words & Linguistics	Entertainment
$\int f(x)dx$ Calculus & Analysis	Computational Sciences	Money & Finance	Household Science
$\frac{dy}{dx}$ Geometry	Earth Sciences	Food & Nutrition	Household Math
$y''(x)$ Differential Equations	Materials	Political Geography	Hobbies

Bu oynaning Mathematics bo‘limidan  $y''(x)$  Differential Equations bandi tanlanadi. Namunaviy differensial tenglama o‘rniga berilgan tenglama va boshlang‘ich shart vergul yordamida ajratilib kiritiladi:



2-misol. Koshi masalasini yeching:

$$(1+x^2)dy + (1+y^2)dx = 0$$

Tenglamani  $(1+x^2)(1+y^2) \neq 0$  ga bo‘lib, o‘zgaruvchilarni ajratamiz:

$$\frac{dx}{1+x^2} + \frac{dy}{1+y^2} = 0$$

Bu tenglamani integrallaymiz:

$$\arctgx + arctgy = C .$$

Bundan

$$\tg(\arctgx + arctgy) = \tg C, \quad \frac{x+y}{1-xy} = C_1 ,$$

$$\text{bu yerda } C_1 = \tg C \text{ yoki } y = \frac{C_1 - x}{1 + C_1 x} .$$

$C_1$  o‘zgarmasning qiymatini boshlang‘ich shartdan topamiz:  $C_1 = 1$ .  
Demak, berilgan Koshi masalasining yechimi

$$y = \frac{1-x}{1+x} .$$

(1+x^2)dy+(1+y^2)dx=0

NATURAL LANGUAGE MATH INPUT EXTENDED KEYBOARD EXAMPLES UPLOAD RANDOM

Input  
 $(1+x^2)dy+(1+y^2)dx=0$

ODE names  
 Separable equation

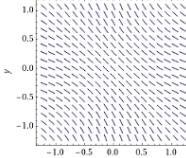
$$\frac{y'(x)}{-1-y(x)^2} = \frac{1}{1+x^2}$$

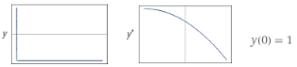
Riccati's equation

$$y'(x) = -\frac{y(x)^2}{1+x^2} - \frac{1}{1+x^2}$$

ODE classification  
 first-order nonlinear ordinary differential equation

Differential equation solution Step-by-step solution  
 $y(x) = -\tan(c_1 + \tan^{-1}(x))$

Slope field  


Plots of sample individual solution  


Sample solution family  


Download Page POWERED BY THE WOLFRAM LANGUAGE

Umumiy yechim	Umumiy yechimlar oilasi
---------------	-------------------------

3-misol.  $y' + 2y = 3x + 5$  tenglamaning umumiy yechimini toping.  
 Tenglamani  $y' = 3x - 2y + 5$  ko‘rinishda yozib olamiz.  
 $u = 3x - 2y + 5$ ,  $u' = 3 - 2y'$  o‘rniga qo‘yishlar bajarib,  $y' = 3x - 2y + 5$  tenglamani o‘zgaruvchilari ajraladigan tenglamaga keltiramiz:

$$3 - u' = 2u \text{ yoki } \frac{du}{dx} = 3 - 2u$$

$$\text{Bundan } \frac{du}{2u-3} = -dx.$$

Bu tenglamani integrallaymiz:  $\frac{1}{2} \ln |2u-3| = -x + \ln C$  yoki  $2u-3 = Ce^{-2x}$ .

Teskari o‘rniga qo‘yish bajarib, berilgan tenglamaning umumiy yechimini topamiz:

$$6x - 4y + 7 = Ce^{-2x}.$$

y'+2y=3x+5

NATURAL LANGUAGE MATH INPUT EXTENDED KEYBOARD EXAMPLES UPLOAD RANDOM

Input  
 $y'(x) + 2y(x) = 3x + 5$

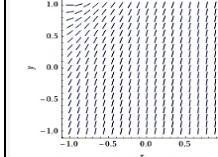
d'Alembert's equation

$$y(x) = \frac{x^3}{2} + \frac{1}{2}(5 - y'(x))$$

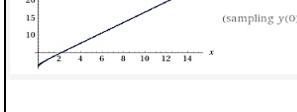
ODE classification  
 first-order linear ordinary differential equation

Alternate form  
 $y'(x) = -2y(x) + 3x + 5$

Differential equation solution Approximate form Step-by-step solution  
 $y(x) = c_1 e^{-2x} + \frac{3x}{2} + \frac{7}{4}$

Slope field  


Plots of sample individual solution  


Sample solution family  


Umumiy yechim
---------------

### Foydalilanilgan adabiyotlar ro’yxati

1. Sh. R. Xurramov Oliy matematika masalalar to‘plami nazorat topshiriqlari II qism Toshkent 2015

WolframAlpha web sahifasi dasturlar majmuasi