MathStuf 68k

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Contents

1 Using MathStuf

Usage This program is designed to help you with most of your needs that are math related on a high school level. There are a few other features that are useful for other uses. Be sure to read this file before using a feature of MathStuf that you do not know how to use.

Running The first time you run MathStuf, make sure it is unarchived, it will take a while to load because the TI-OS checks for errors on the initial running of a program. If it is archived, the check will be run every time you run the program until it is unarchived and run. After the initial run, you may archive it. You will never need to do this again if you do not open the code while it is unarchived between uses. All single letter variables are deleted upon running MathStuf, no matter what they are, so be sure to backup your data before running the program. The modes are changed inside of the program, but your modes are saved and restored if exit throught the main menu, else they are left the way it is set in the program.

Error Checking I have excluded error checking because I am expecting you to use common sense in your inputs.

Answers Answers are returned in either exact or approximate formats depending on the option chosen in the options menu.

2 Functions

This will manipulate a function for most of your needs. It works a little like an RPN[1] calculator. It will first prompt you for $f(x)$ and then you may choose what operation to do with it. Make sure that $f(x)$ is in terms of x and does *not* include a, b, c, d, e, f, g, h, i, j, k, l, m, n, or o because those variables are used internally and will be (most likely) assigned values. Any other variables will be treated as blank. You can do the following with a function:

1. Addition
   -Adds two functions together
2. Subtraction
   -Subtracts one function from another
3. Multiplication
   -Multiplies two functions together
4. Division
   -Divides one function into another
5. Power
   -Takes a function to a power
6. Derivative
   -Finds the first derivative of a function
7. Integral
   -Finds the antiderivative of a function
8. Composition
   -Finds the composition of two functions
9. Calculus
   -Finds values for different transformations in calculus
   - Arc Length
     -Finds the length of a function on an interval

[1] Reverse Polish Notation

- Area
  - Exact
    -Finds the exact area bounded by a curve and the x-axis
  - Riemann Sums
    -Approximates the area bounded by a curve and the x-axis using rectangles
  - Trapezoidal Rule
    -Approximates the area bounded by a curve and the x-axis using trapezoids
  - Simpson's Rule
    -Approximates the area bounded by a curve and the x-axis using Simpson's Rule
  - Between Functions[2]
    -inds the area between two curves by either the default[3] or on a set interval
- Surface Area of Revolution
  -Finds the surface area of the an area bounded by two curves rotated around a given line
- Volume of Revolution
  -Finds the volume of an area bounded by a two curves rotated around a given line
- Center of Area
  -Finds the center of mass for an area bounded by two curves

10. Factor
    -Factors a function
11. cFactor
    -Completely factors a function
12. tCollect
    -Collects trigonometric functions together
13. tExpand
    -Expands trigonometric functions

[2]This works, but the extracting of the extrema from the functions is a little buggy so the y-axis settings may not look right. The

[3]The minimum and maximum are based on intersection points

14. Common Denomenator
    -Gets a function over a single denominator

15. Numerator
    -Extracts the numerator of a function

16. Denominator
    -Extracts the denominator of a function

17. Summation
    -Finds the summation of x within bounds in a function

18. Product
    -Finds the product of x within bounds in a function

19. Limit
    -Finds a the limit as x approaches a constant from the left, both sides, or the right

20. Zeros
    -Finds the zeros of a function

21. Expand
    -Expands a function

22. General→Specific[4]
    -Finds the constant of integration in a function given a point it passes through

23. Intersect
    -Finds the intersection points of two functions

24. Graph
    -Graphs the function using the current window settings[5]

[4]The function must not have a constant in it otherwise it is already a specific function. There is error checking for the constant.

[5]I may change it to custom window setting if they are desired enough.

3 Numbers

Given a number, this will get different values associated with it. You may:

1. Factor
   -Finds all factors of a number and their sum

2. Prime Factor
   -Finds the prime factorization of a number

3. nth Root
   -Finds all n roots of a number

4. Logarithm
   -Finds the logarithm of a number in any base

4 Geometry

Finds values of basic geometric shapes. It will solve for all data possible with each shape.

1. Polygons
   -Finds all the data about an n-gon given the apothem[6], radius[7], or the side length

2. Polyhedra
   -Finds all the data about a regular polyhedron given the apothem, radius, or the side length

3. Triangles
   -Finds the sides, angles, and area of a triangle if enough information is known

   - SSS
     -Use if all three sides are known
   - AAS
     -Use if two angles and one of the sides not included betwenn them
   - SAS
     -Use if two sides and the included angle is known
   - ASA
     -Use if two angles and the included side is known

4. Conics[8]

   - Data
     - Circle
       -Finds all the data about a circle given its equation
     - Ellipse
       -Finds all the data about an ellipse given its equation
     - Parabola
       -Finds all the data about a parabola given its equation

[6]The distance from the center to the midpoint of a side
[7]The distance fron the center to a vertex
[8]Currently under construction

  - Hyperbola
    -Finds all the data about a hyperbola given its equation

5. Vectors

   - Standard Form
     -Finds the vector in standard form given either the magnitude and angle or the initial and terminal points
   - Data
     -Finds the following data about vectors when in standard form:
     - Magnitude
       -Finds the magnitude of the current vector
     - Unit Vector
       -Finds the unit vector that correspond to the current vector
     - Orthagonal
       -Finds a vector that is orthagonal to the current vector (2D only)
     - Angle
       -Finds the angle between two vectors
     - Cross Product
       -Finds the cross product of two vectors (2D and 3D only)
     - Vector Projection
       -Finds the projection of one vector onto antoher (2 vectors only)
     - Dot Product
       -Finds the dot product of two vectors
     - Resulatant
       -Finds the resultant off all the vectors
     - Next
       -Goes to the next vector

6. Other

   - Ellipse
     -Finds the area and perimeter of an ellipse if both radii are known
   - Ellipsoid
     -Finds the surface area and volume of an ellipsoid if all three radii are known

- Pyramid
  -Finds the surface area and volume of a pyramid if the base area and height are known
- Prism
  -Finds the surface area and volume if the base area and height are known
- Torus[9]
  -Finds the surface area and volume of a torus if both radii are known

[9]Commonly known as a donut

5 Statistics

This will allow you to get statistical data from lists of data

1. One Variable
   -Finds the following data about a list:

   - Mean
     -Finds the arithmatic mean of a list
   - Sum
     -Finds the sum of the elements in a list
   - Sum of Squares
     -Finds the sum of the squares of the elemets in a list
   - Standard Deviation
     -Finds the standard deviation of a list
   - Population Deviation
     -Finds the popular deviation of a list
   - Elements
     -Finds the number of elements in a list
   - Minimum
     -Finds the minimum value in a list
   - Maximum
     -Finds the maximum value in a list
   - First Quartile
     -Finds the first quartile of a list
   - Median
     -Finds the median of a list
   - Third Quartile
     -Finds the third quartile of a list
   - Inner Quartile Range
     -Finds the inner quartile range of a list
   - Harmonic Mean
     -Finds the harmonic mean of a list
   - Geometric Mean
     -Finds the geomtric mean of a list

- Product
  -Finds the product of the elements in a list
- Variance
  -Finds the variance of a list
- Range
  -Finds the range of a list
- Mode
  -Finds the mode of a list

2. Two Variable[10]
   -Finds the following data about two lists:

   - Sum of Products
     -Finds the sum of the two lists multiplied by each other

3. Regressions
   -Finds a function that best fits a set of data points using any of these types of regressions:

   - Polynomial
     -Fits the data to a function in the form of $a_0+a_1x^1+\ldots+a_{n-1}x^{n-1}$ where n is the number data points
   - Exponential
     -Fits the data to a function in the form of ae^{bx}
   - Power
     -Fits the data to a function in the form of ax^b
   - Logistic
     -Fits the data to a function in the form of $\dfrac{a}{1+be^{cx}}+d$
   - Logarithmic
     -Fits the data to a function in the form of $a+b\ln x$
   - Sinusoidal
     -Fits the data to a function in the form of $a\sin(bx+c)+d$

[10] If there is anymore data that can be extracted from two lists, please notify me.

6 Miscellaneous

This is a collection of functions that do not fit anywhere else.

1. Systems of Equations
   -Given the coeffecients and constants in a linear systems of equations, this calculates each variable as close as possible

2. Compound Work
   -Given the time it takes for individuals to complete a task, this calculates the amount of thim it will take for the task to be completed if they worked simultaneously

3. Exponential Growth/Decay
   -Given either two values and their times or the rate and an amount with its time, this will calculte the amount or time given the other

4. Interest
   -Given the initial amount, the interest rate, the time, and the number of times it is compounded in the number of units that the time is in, this will give continuous, sompounded, and simple interest amounts at the end of the time period

5. Center of n-D System
   -This finds the balancing point of a system of masses at given points

6. Temperatures
   -Converts between Farenheit, Celsius, Kelvin, Rankine, and Réaumur scales.

7. Random Solver
   -Finds the maximum amount of guesses needed to be 100% sure of a random number in a given range.

8. Home[11]
   -This is a built in home screen that will do math for you without exiting the program. Some functions are not available due to the TI-OS being nit-picky about what is allowed to be done in basic programs.

[11] Typing QUIT (case-sensitive) will return you to the main menu.

7 Options

1. Answers
   -These options deal with the storage and the display of answers given in MathStuf

   - Format
     -The option to display answers in exact or approximate mode
   - Store[12]
     -The option to keep answers for later use
   - Amount[13]
     -The option of how many answers are to be kept for later reference
   - Storage
     -The option of whether answers are stored in archive or RAM memory
   - Clear
     -The option to reset the answer counter and delete all answers stored

2. Options
   -Simply where the options are to be stored, in archive or RAM

[12]The answers are stored in the folder mathstuf.

[13]If the amount of answers given exceeds this limit, previous answers are overwritten without confirmation.

8 Help

This section in the program, ironically, is no help at all because otherwise the program would become unwieldly huge. This file is your best source of help. If you need any more help, just e-mail me or send a feedback form on the site.

9 About

This is copyrights, a little about the program, and special thanks to:

- Me
- TI
- All the math references that were used
- Especially my Beta Testers:
  - solitaire710
  - Morgan
  - greenorange
- Bug Helpers:
  - marco1pabst
  - Bullfrog

10 Version History

- Version-.75
  Date-May 11, 2005
  Size-mathstuf-14586
  New Stuff-
  - Everything

  Bugs-
  - Area Between Functions doesn't get window settings correct
  - Portions of Conics missing

- Version-.80
  Date-May 18, 2005
  Size-mathstuf- bytes
  New Stuff-
  - Area Between Functions window bug fixed
  - Axis of rotation can now be chosen in Volume and Surface Area of a Revolution

  Bugs-
  - Portions of Conics still missing

11 To-Do List

What needs to get done in the program

- Finish Conics section
- Make Splash Screen
- Port to other calculators

12 Disclaimer

Using Code in your Programs Do *not* steal code from the program and claim it as yours. If you want to use it in you program, add a comment in your code as to where it came from and give me credit in the documentation/help.

Cheating I cannot be blamed if you are caught cheating using my program at all.

Errors It is not my fault if you get a wrong answer because of my program *no matter what*. There is no guarantee that it is 100% fool-proof, so do *not* come to me asking why you got a wrong answer if you did not fully read and follow this manual. If you followed the manual and still received a wrong answer, e-mail me at MathStuf@gmail.com with the input and the subprogram involved and I will try to get back to you as soon as I can find and fix the problem. Thank you for downloading MathStuf and I hope it will help you.