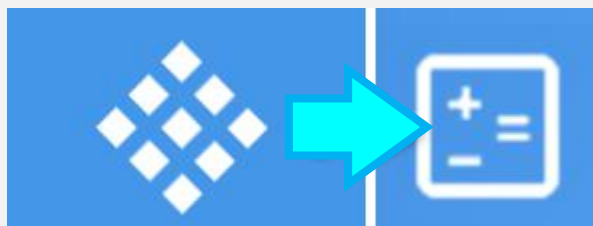







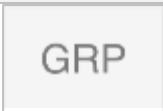
















Calculator



Key		Function
		Browse History
		Expression Splitter
		Undo (Up to 30 Step)
		Redo (Up to 30 Step)
		Graph Equations
	 	Assign Custom Equations
		Open OXY Page
		Fraction/Degree Conversion
		SCI/ENG Notation



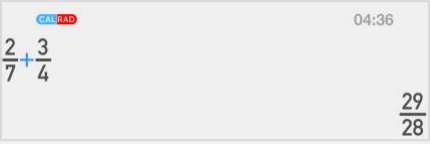

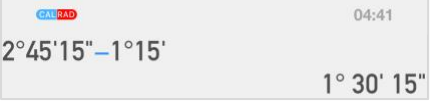

Fraction & Degree

Key	Function
  	Input a Fraction
	Input a Mixed Fraction
    3 	Input a Degree : Min : Sec Indicator
	Convert Current Result To (Mixed) Fraction and Degree Form

Notice: Turn On [\[Auto Convert To Fraction\]](#) Option in Setting  to Get Fraction Form Automatically.

Example

Fraction & Degree



Variables (Extension)

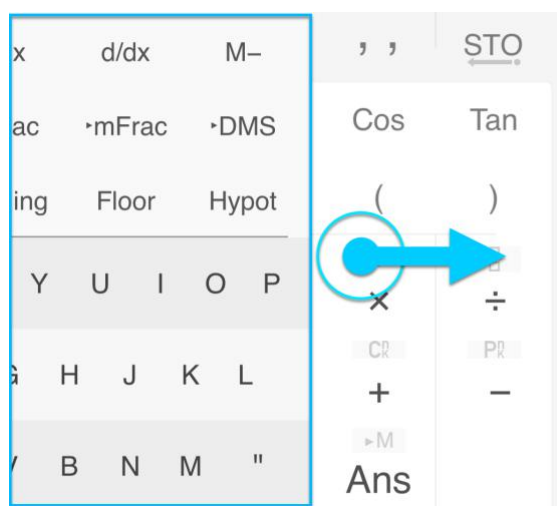
Common Variables



X, Y, Z, M

Extended Variables

iPhone / iPod



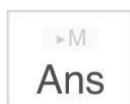
Slide Keyboard to The Right

iPad



Press [ABC] Key

Result Variable



The last calculation result is stored in Res memory; The Res memory content is updated whenever a new calculated expression is displayed. Res memory helps your calculation continuing.

Notice: All Variables is distinct in Matrix/Vector and Complex Mode

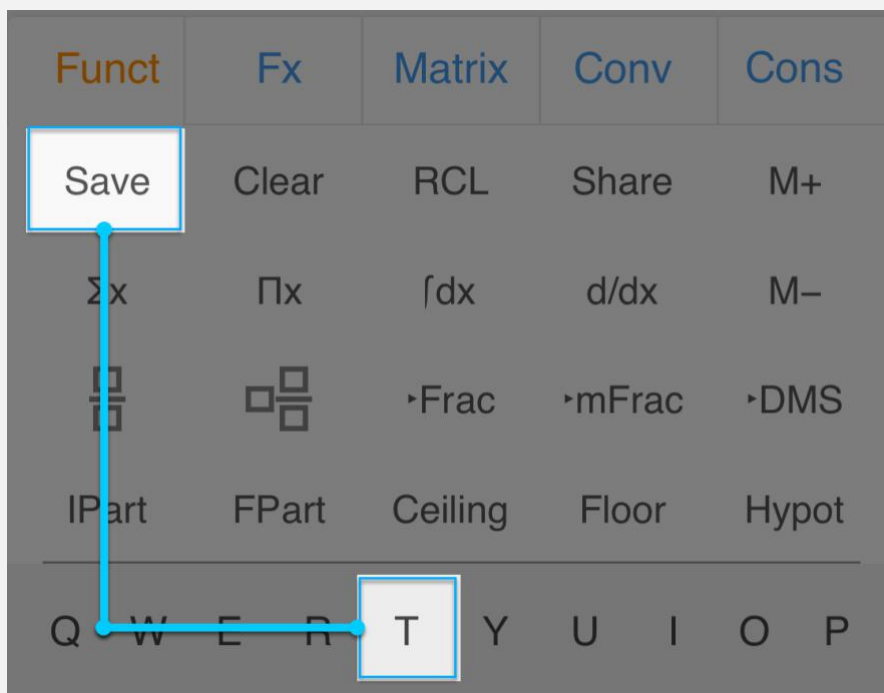


Save to Variables

Context Menu: Tap the result, scroll to the right to save the value to common variables.



Alternative Way: Press [Save] followed by variable key to save the current value to Variables.





Assignment Operator & M±

Key	Function
M+	Add M by Current Value
M-	Subtract M by Current Value
STO	Assignment Operator

Example

Assignment

CALRAD 05:01
M ← 10 10



Assign 10 To M, Notice That [Shift] + [9] is M Key.

Assignment & Splitting Expression

x ← 5; x + 5 10



The above expression contains two sub-expressions. The 1st one assign 5 to X, the next one calculates $X+5 = 10$ (where $X = 5$).



Custom Functions (Fx)

Single Variable F(X)

$$F_1(x) \leftarrow 5x + 2$$

Double Variables F(X,Y)

$$F_2(x, y) \leftarrow 5x + 3y - 2$$

Triple Variables F(X,Y,Z)

$$F_3(x, y, z) \leftarrow 2x - 3y + 3z$$

Assign Fx Functions

$$2X+5$$

Step 1:

Input Based-X Equation

Step 2:

Press [Shift] + [2] (Fx Key)

Step 3:

Select the Target Function.

Fx

OR

Shift↑

+

IFX

2

Fx Assignment

Select Function to Assign

Assign to F1

Notice:

All Fxs are synched with Graph Fx Equations in Calculator Mode



Plot (Graph) Equations

Key	Feature
<div><div>FXs</div><div>OR</div><div><div>Shift↑</div><div>+</div><div>iGRP 1</div></div></div>	<div>Plot Current Equation</div> <div><i>Notice: Please Input Equation First</i></div>
<div>GRP</div>	<div>Open OXY Page</div>
Key	Feature
<div><div>Snap</div><div>Graph Calculation</div><div>-300</div><div>Screenshot & Share</div></div>	<div><div>TRACE </div><div>CALC </div><div>SHARE </div><div>CLOSE </div></div>

Notice: All Graph Fx Equations are synched with Fxs in Calculator Mode



Example of Plotting

Example

$$0.25X_2-5$$

FXs

OR

Shift↑

+

iGRP

1

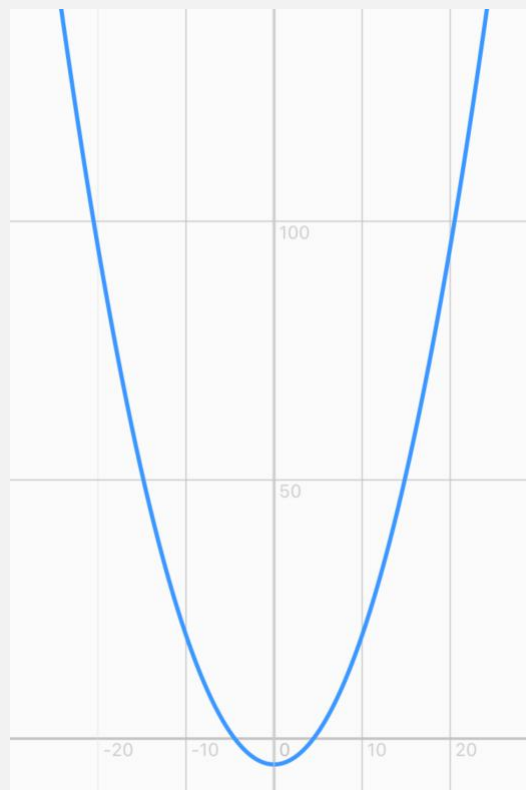
Graph Page Action
Select Function to Plot

Plot as F1

Step 1:
Input Based-X Equation




Step 2:
Press [Shift] + [1] (GRAPH)

Step 3:
Select the Target Function.





Solve General Equations

Key	Feature
	Input “=” Symbol
	Solve Equation (<i>Press Normally</i>)
	Split Equation in System of Equations

Example

General Equation

ALGRAD 04:08

$$\left(5x^2 - \frac{4}{3}\right) = 3x\left(\frac{x}{2} + 5\right)$$

System of Linear Equations

ALGRAD 04:10

$$5(x + y) = 15; y = 8(7 + x)$$



STATISTICS



Single Variable

Key	Function
 X_{i+}	Insert Current Result or Expression to Data Set
	Open Statistical Page (Mean, Sum, Median...)
n	Number of Elements
\bar{x}	Average Value (Mean)
$\sum x$	Total Value (Sum)
$\sum x^2$	Square of Total Value
$\sigma(x)$	Standard Deviation
$\sigma_{-1}(x)$	Standard Deviation of First N-1 Elements
PDF	Probability Density Function (General Normal Distribution)
CDF	Cumulative Density Function (General Normal Distribution)



Edit & Sort Data

...	DEL	CLR		...	DEL	CLR
#	Val	Freq		#	Val	Freq
1	56	1		1	56	1
2	55	1		2	55	1
3	33	1	▶M	3	45	1
4	25	1	Xi+	4	25	1
5	99	1		5	99	1

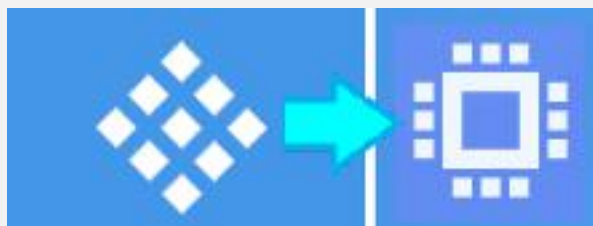
Tap to select element, Press [Xi+] to Insert new value

Data Set:	...	DEL	CLR
Vals: <input type="radio"/> L1 L2 L3 L4 L5	#	Val	Freq
Freq: <input type="radio"/> L1 L2 L3 L4 L5	1	56	1
Sort: Val ▲ Val ▲ Freq ▲	2	55	1
Val ▼ Val ▼ Freq ▼	3	33	1
	4	25	1
	5	99	1
	6		

Press [...] to Sort and select Data Set



Base mode



011_{BIN}+0F_{HEX} Custom Base

18

Default Base

09 Nonary
10 Decimal
11 Undecimal

AC



2's

Insert Custom Base



BIN

OCT




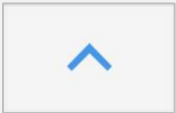

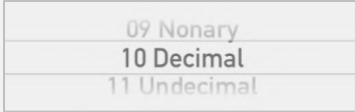



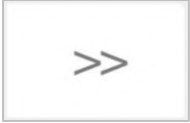
DEC

HEX

Type	Description
Default Base	The Base of Result.
Custom Base	The Base of Number in expression.



Base Mode Keys

Key	Function
	Main Menu
	Previous Calculation
	Next Calculation
	Change Default Base
	Two's Complement
	Insert Custom Base
	Bitwise Left Shift
	Bitwise Right Shift

Notice: Result will be display in appropriate data size automatically (8, 16, 32 or 64 bit signed and unsigned integer).



Base-Calculation Example

Base Calculation Examples

011_{BIN}+0F_{HEX}

0001 0010

|

02 Binary
03 Ternary

011 in Binary plus 0F in Hexadecimal. The Result is displayed in Binary.

001 << 2

4

|

09 Nonary
10 Decimal
11 Undecimal

001 in Decimal (Default Base) shift left two positions. The Result is displayed in Decimal.

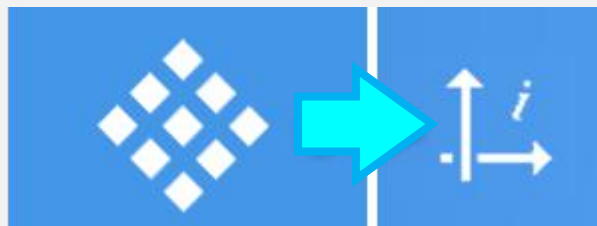
010 ORB 101



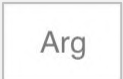
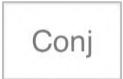

0000 0111

|

02 Binary
03 Ternary

010 or 101 (In Binary). The Result is displayed in Binary (Unsigned 8 Byte).



Key	Function
	Imaginary Unit ($i = \sqrt{-1}$)
	Polar (Radius \angle Angle)
	Argument
	Conjugate
	Convert the Result to Polar/Coordinates Fraction Form

Notice:

- + Almost other functions (Trigonometry, Logarithm, Exponent, Sum, Product...) supports complex number.
- + Integral, Derivative and Equation Solver are not supported in complex mode.



Complex Calculation Example

Polar / Coordinates

CMX DEG 09:38
 $5+2i-\sqrt{2}\angle 45$

09:38

$4+1i$

$\sqrt{2}\angle 45$ is $1+i$.

Conjugate

CMX DEG 09:39
Conj(5-3i)

09:39

$5+3i$

Conj 5 - 3 i) =

Conjugate of $5 - 3i$

Argument

CMX DEG 09:39
Arg(2+2i)

09:39

45

Arg 2 + 2 i) =

Argument of $2 + 2i$, i.e The angle of $2 + 2i$ in Polar Form.

Fraction

CMX DEG 09:39
 $2.5-(3\div 2)i$

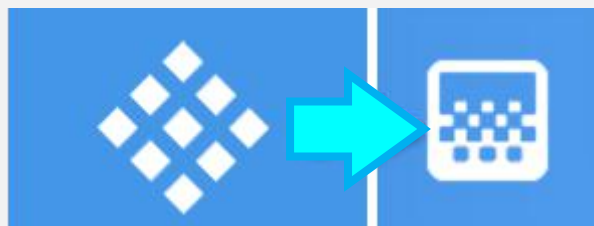
09:39


$\frac{5}{2}-\frac{3}{2}i$

$2.5-(3\div 2)i$



Matrix / Vector



Key	Function
$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$	Insert / Resize Matrix
$[]^{-1}$	Inverse
$[]^T$	Transpose
Det	Determinant
Eigen	Calculate Eigen Value
Cramer	Cramer's Rule Solver
Cross	Cross Product (Vector Only)
Dot	Dot Product (Vector Only)
 Zoom	Expand / Collapse Result Matrix

Notice:

- + Default values of blank elements are zero.
- + One-Row Matrices are treated as Vectors.
- + Almost other functions (Trigonometry, Logarithm, Exponent, Sum, Product...) supports Matrices / Vectors.
- + Integral, Derivative and Equation Solver are not supported in Matrix/Vector mode.



Insert/Resize Matrix & Vector

Funct	Fx	Matrix	Conv	Cons
<div><div>1 2 3 4 5 6 7</div><div>×</div><div>1 2 3 4 5 6 7</div><div>ADD</div><div>RESIZE</div></div>				
[2×2]	[2×3]	[3×2]	[3×3]	[3×4]
Edit	[A]	[B]	[C]	[D]

Notice: Move the cursor (I Beam) into the target matrix followed by pressing [RESIZE] to resize it.



Matrix & Vector Example

Matrix Inverse

MAT DEG 10:02

$$\begin{bmatrix} 1 & 2 & 0 \\ 0 & 4 & 0 \\ 0 & 1 & 2 \end{bmatrix}^{-1}$$
$$\begin{bmatrix} 1 & -0.5 & 0 \\ 0 & 0.25 & 0 \\ 0 & -0.125 & 0.5 \end{bmatrix}$$

The blank elements are zero.

Cross Product

MAT DEG 10:02

$$[1 \ 2 \ 3] \times [4 \ 5 \ 6]$$
$$[-3 \ 6 \ -3]$$

Matrix Transpose

MAT DEG 10:03

$$\begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}^T$$
$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$



Calculate Eigen Values

MAT DEG 10:04

$$\text{Eigen}\left(\begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix}\right)$$

[1 2]

$M = V D V^{-1}$. $\lambda_1 = 1$ and $\lambda_2 = 2$

$$M = \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix} \times \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

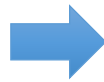
Cramer's Rule Solver

$$1X + 2Y + 3Z + 4T = 5$$

$$6X + 7Y + 8Z + 9T = 0$$

$$2X + 4Y + 1Z + 3T = 5$$

$$5X + 7Y + 8Z + 9T = 6$$



MAT RAD 05:08

$$\text{CRR}\left(\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 6 & 7 & 8 & 9 & 0 \\ 2 & 4 & 1 & 3 & 5 \\ 5 & 7 & 8 & 9 & 6 \end{bmatrix}\right)$$

[-6 4 1 0]

Notice: Each element of the matrix must be matched to each coefficient in the linear system.

In above example $X=-6$, $Y=4$, $Z=1$, $T=0$ is an only solution.



Common Equation Solvers

Mode	Feature
	Quadratic Equation Solver
	Cubic Equation Solver
	System of Linear Equations with 2-Unknown Solver
	System of Linear Equations with 3-Unknown Solver

Select the appropriate Mode for the target Equations.



Common Equation Solvers

Example

$$2X^2 - 3X + 5 = 0$$

	Ax ²	Bx	C
1	2	-3	5
C=			

$$X + Y = 2 \text{ \& } X - Y = 3$$

	Ax	By	=C
1	1	1	2
2	1	-1	3
C ₂ =			

Keys Pressed

iFX	=	PR	/	=	F2
2		-	3		5

IGRP	=	IGRP	=	iFX	=
1		1		2	
IGRP	=	PR	IGRP	=	/
1		-	1		3

Notice:

Input all of necessary coefficients (one by one). Tap the coefficients or Press [Up] or [Down] to select and change the value.





Regression



STATISTICS



Regression

Key	Function
 X_{i+}	Insert Current Result or Expression to Data Set $XY, XY, XY...$
	Open Regression Page (Type, Equation, Error...)
n	Number of Pairs (X, Y)
$\sum x$	Sum of all X
$\sum y$	Sum of all Y
$\sum xy$	Sum of all XY
$\sum xy / \sum y$	Sum of all XY divided by Sum of all Y

$\sum xy / \sum y$ would be considered as Sum of all value
x weight / total weight, where weight is y.



Data & Regression

REG RAD

Select Data Set

10:26

≡ Linear $Y = Ax + B$

Change Regression Type

...

DEL

CLR

#	X	Y
1	6	3
2	2	5
3	3	5
4	4	1
5		

...	DEL	CLR
#	Val	Freq
1	56	1
2	55	1
3	33	1
4	25	1
5	99	1

45

► M

X_{i+}



...	DEL	CLR
#	Val	Freq
1	56	1
2	55	1
3	45	1
4	25	1
5	99	1

Tap to select element, Press $[X_{i+}]$ to Insert new value



Algebra Mode



Key	Function
	Open Streamline Scheme
	Close Streamline Scheme

ALG DEG 10:39

$$\int \sin(x) + 3x^2 dx$$

$$x^3 - \cos(x)$$

ALG DEG 10:39

$$x^2 + 2x - 15$$

$$\text{Factor}(x^2 + 2x - 15, x)$$

$$(x - 3)(x + 5)$$

ALG DEG 10:39

$$(x + 5)^3$$


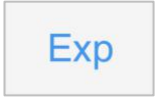

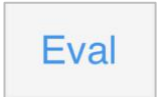


$$x^3 + 15x^2 + 75x + 125$$

The Streamline Scheme on iPad

Streamline is an advanced history section, which displays the history of calculation. In addition, it allows controlling, editing and operating with the previous calculations.



Algebra Special Keys

Key	Function
	Simplify the Equation
	Expand the Polynomial
	Factor An Integer or Polynomial
	Evaluate the Approximate Result
	Plug in Variables to the Equation
	Save the Result to Variables or Fx Functions

Notice:

- + All Operations appear once the streamline is opened,
The equation should be entered first before operating.
- + All Operations are applied to the latest (final) result.
- + Plug In Operation is applied to X Y Z Variables. The
other variables are plugged in automatically.



Algebra Operation Example

Simplify

ALG PAD 12:36

Simplify($1 - \sin(x)^2$)

$\cos(x)^2$

IGRP 1 P2 - Sin X) X²

= Simplify

Note: $\sin^2(x) + \cos^2(x) = 1$

Expand

ALG DEG 10:43

$\frac{x^2+5}{x-2}$

Expand($\frac{x^2}{x-2} + \frac{5}{x-2} \cdot x$)

$\frac{x^2}{x-2} + \frac{5}{x-2} \cdot x$

$\frac{9}{x-2} + x + 2$

Shift \div X X² CR + F2 5

X P2 - iFX 2

= Expand

Factor

ALG DEG 10:43

7!

5040

Factor(5040, x)

$2^4 3^2 5 \times 7$

Y 7 X! = Factor

$7! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7$, $6 = 3 \times 2$, $4 = 2 \times 2$

Eval

ALG RAD 10:44

$\sin\left(\frac{\pi}{4}\right)$

$\frac{1}{\sqrt{2}}$

Eval($\frac{1}{\sqrt{2}}$)

0.7071067811865

Sin π Shift \div F1 4

= Eval \approx





Algebra Context Menu

$12+5+\frac{6}{3}$ ——— Tap to Open Context Menu

Action

 Insert  Copy  Retry  Eval  Simpl  Exp

Algebra

Key	Function
 Insert	Insert the Selected Equation to Input Form
 Copy	Copy the Equation as Plain Text
Eval [≈]	Evaluate the Approximate Value
Plug (In)	Plug in Variables to the Selected Equation
Simpl Simplify	Simplify the Selected Equation
Exp Expand	Expand the Selected Polynomial
Fact Factor	Factor the Selected Number / Polynomial
F1, F2, F3	Save the Selected Equation / Number to Fx Functions
X, Y, Z, M	Save the Selected Number to X, Y, Z, M Variables



Indefinite Integral

ALG/RAD 10:46

$$\int \square \quad 3x^2 + \cos(x) \, dx \quad ? \quad \square$$

$x^3 + \sin(x)$

$\int dx$ $\frac{1}{3}$ x x^2 $\frac{CR}{+}$ \cos x $=$

Leave left & right argument empty to calculate indefinite integral

Derivative

ALG/RAD 10:46

$$\frac{d}{dx} (\sin(x) + 5x) \Big|_{x=\square} \quad ? \quad \square$$

$\cos(x) + 5$

d/dx \sin x $)$ $\frac{CR}{+}$ $F2$ 5 x $=$

Leave the second argument empty to calculate derivative of an equation

Limit Calculation

ALG/RAD 10:46

$$\lim_{x \rightarrow \infty} \left(\frac{2x^2 + 5}{3x^2 + 25} \right) \quad ? \quad \square$$

$\frac{2}{3}$

\lim ∞

$\frac{IFX}{2}$ x x^2 $\frac{CR}{+}$ $F2$ 5

$\frac{1}{3}$ x x^2 $\frac{CR}{+}$ $\frac{IFX}{2}$ $F2$ 5

Notice: Only some common type of limit calculation problem is supported.



Taylor Series Expansion

Taylor(F, Variable, Degree, Value)

Argument	Description
F	Function
Variable	Respected Variable
Degree	Maximum Degree
Value	A Point

Taylor returns the Taylor Series Expansion of [F] respect to [Variable] at point [Value] to the maximum of power expansion [Degree].

Examples

ALGRAD 10:48

Taylor(Sin(x), x, 5, 0)

$$\frac{x^5}{120} - \frac{x^3}{6} + x$$

Taylor Sin x , , x

, , F2 5 , , % 0 =

ALGRAD 10:48

Taylor(Ln(x), x, 3, 1)

$$\frac{x^3}{3} - \frac{3}{2}x^2 + 3x - \frac{11}{6}$$

Taylor Ln x , , x

, , / 3 , , IGRP 1 =