

MxCalc 15c

for SmartPhone

Version 1.0
User Guide

Product of:-

3GR Technologies

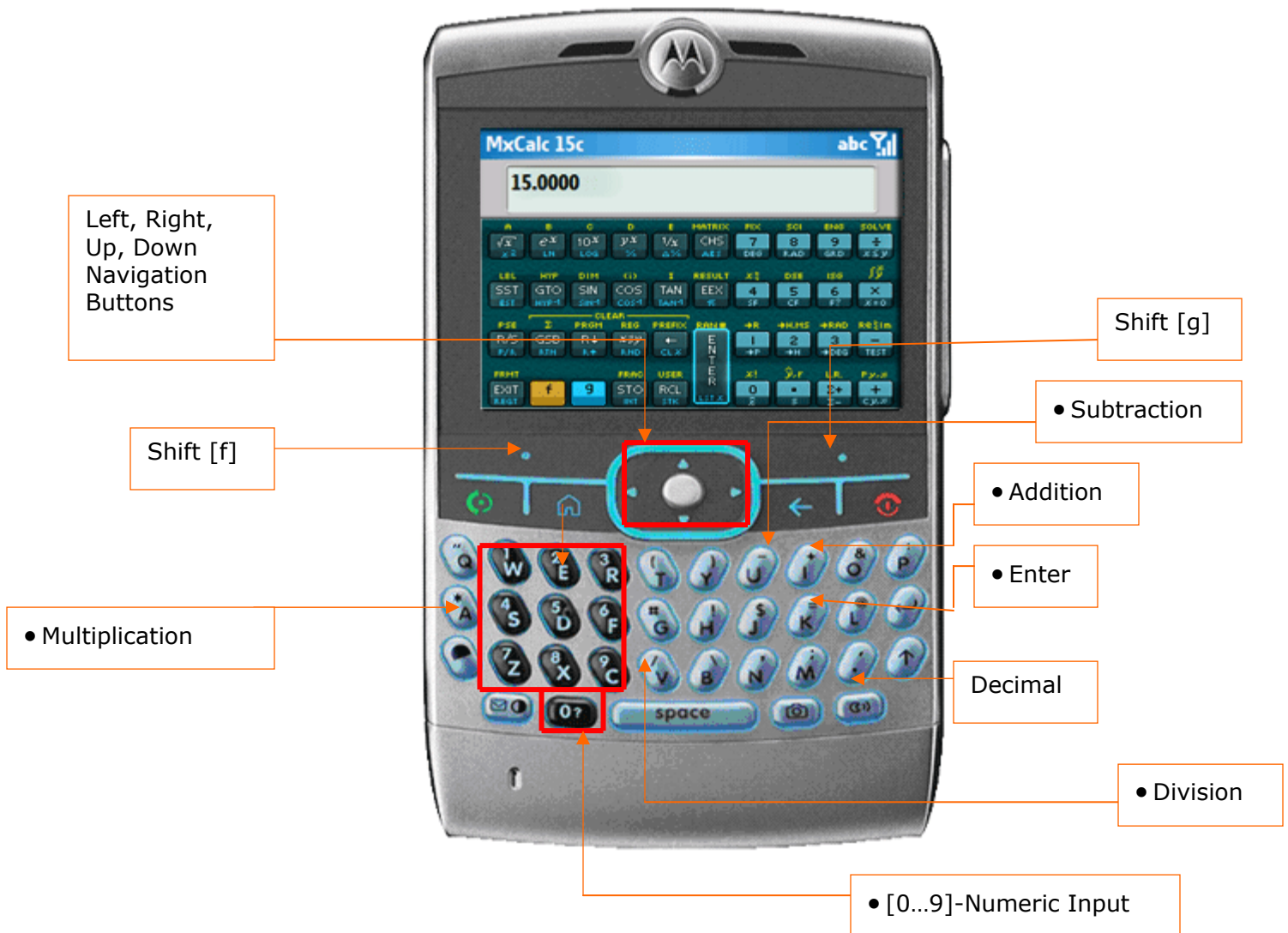
For Installation information & Sales/Support contacts refer the Read Me.

Contents

1. Overview.....	3
2. Frequently Asked Questions.....	6
3. Tips and Tricks.....	9
4. Examples.....	12
5. Functions Reference.....	24
6. How to Register.....	26

1. Overview

Key mapping for QWERTY keyboard (MotoQ, Samsung Blackjack, T-Mobile Dash etc.)



Key Mapping for Other Smartphones

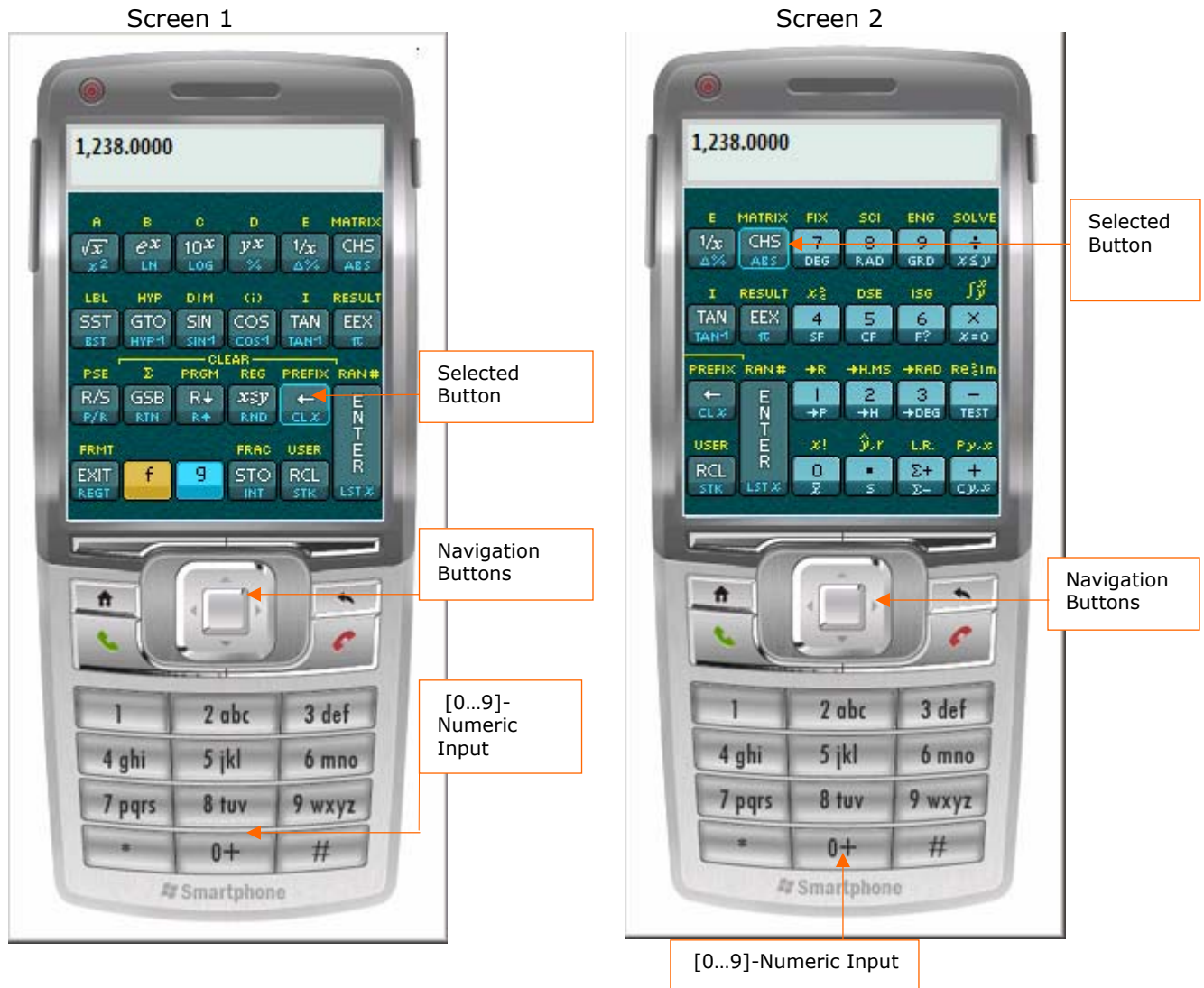


Selected Button

Left, Right,
Up, Down
Navigation
Buttons

[0...9]-Numeric Input

For better view press Right Soft Key.
 Pressing Right Soft Key opens the dual screen mode. To navigate between screens scroll through the buttons.



To get back to the single screen press Left Soft Key again.

2. Frequently asked questions

- [What is the \[STK\] button for?](#)
 - [How do I change the number of decimal places?](#)
 - [How do I Register?](#)
 - [What does 'C' in display imply?](#)
 - [Why are values displayed in red?](#)
 - [I get incorrect answers?](#)
 - [What do the ERROR messages imply?](#)
-

What is the [STK] button for?

The [STK] button is used to display the contents of all the storage registers. Press [g][STK] in landscape mode or press [STK] in potrait mode to show the storage registers window.

How do I change the number of decimal?

Number of Decimals can be changed by using the following key sequences.

in fixed mode use the sequence [f][FIX][0-9] .

in scientific mode use the sequence [f][SCI][0-9] .

in engineering mode use the sequence [f][ENG][0-9] .

How do I Register?

Pressing the key sequence [g][Exit] will display the registration form .

What does 'C' in display imply?

The 'C' in the display implies that complex mode is on and calculations will be done in complex mode. Note all trigonometric calculations in complex mode are done in Radian mode. To clear complex mode press [CF][8] .

Why are values displayed in red?

The values in display turn red when a overflow has occurred .Flag 9 is set when overflow occurs. To remove the red display press [CF][9] or press backspace this will clear the flag nine set because of overflow.

I get incorrect answers?

MxCalc 15c runs in several modes, for example if the calculator is in complex mode i.e. 'C' is displayed then all trigonometric calculations are done in radian mode even though degree , radian or gradient mode is set to clear complex mode press [CF][8] or else if User mode is set i.e. 'USER' in display then primary and alternate [f] functions of the five keys on the upper left: [\sqrt{x}], [e^x], [10^x], [y^x], [$1/x$] are exchanged so to get back to normal mode press [f][USER] again.

What do the ERROR messages imply?

Error 0

Error 0 is displayed when a improper Math operations has occurred.

Error 1

Error 1 is displayed when a nonmatrix operation is applied on a matrix.

Error 2

Error 2 is displayed when performing a improper statistical operation.

Error 3

Error 3 is displayed when performing a operation on a improper or non existent register or matrix element.

Error 4

Error 4 is displayed when Line number or label referred to does not exist.

Error 5

Error 5 is displayed when subroutine is nested more than 7 levels deep.

Error 6

Error 6 is displayed when trying to refer to a flag number > 9 .

Error 7

Error 7 is displayed when a subroutine called by SOLVE or INTEGRATION contains SOLVE or INTEGRATION.

Error 8

Error is displayed when not able to find a root with the initial values provided.

Error 10

Insufficient Memory.

Error 11

Improper matrix argument for a given matrix operation.

3. Tips and Tricks

1. Input Statistical Data: Set focus on [$\sigma +$] then input numbers using numeric key on the keyboard and press 'Enter' button. Enter all the subsequent Data by entering the numbers & pressing 'Enter' button.
2. To Calculate and other values using keypad (QWERTY Keyboard only)
 - a. Release Number Lock (in case locked for numeric input).
 - b. Press the first characters of the Functions as displayed on the screen. You will see an annunciator displaying the most matching function like the Auto Complete function. When annunciator displays the function name, press 'Enter' button. This method of command reduces the Navigation time required to set focus on a particular function (Button).

Example:

To perform [LN] function by using keypad button:-

1. Input numeric value and then Release Number Lock.
2. Press {I/L} button. Annunciator (right corner of the display area) will display 'LN'.
3. Press {Enter} button to get LN.

Function Shortcuts –

The following shortcuts are not case sensitive & the shortcut(s) characters for the functions not mentioned in the list below remain same as seen on the calculator buttons.

Functions	Shortcut(s)
A	A
ABS	ABS
$\Sigma +$	ASTAT
B	B
BST	BST
C	C
CF	CF
CHS	CHS
CLX	CLX
COS	COS
COSI	COSI
$\Delta\%$	CPER
Σ	CSTAT
$C_{y,x}$	CYX
D	D
DEG	DEG
DIM	DIM

DSE	DSE
E	E
EEX	EEX
ENG	ENG
ENTER	ENTER
e^x	EXP
EXIT	EXIT
x!	FACT
F?	FLAG?
FIX	FIX
FRAC	FRAC
FRMT	FRMT
GRD	GRD
GSB	GSB
GTO	GTO
HELP	HELP
HYP	HYP
HYP-1	HYPI
I	I
(i)	IMG
INT	INT
INTG	INTG
ISG	ISG
LBL	LBL
LN	LN
LOG	LOG
LR	LR
LSTx	LSTX
MATRIX	MATRIX
MEAN	MEAN
%	PER
π	PI
P/R	PR
PREFIX	PREFIX
PRGM	PRGM
PSE	PSE
$P_{y,x}$	PYX
RAN#	RAN
RAD	RAD
RCL	RCL
R down	RDWN
$Re < Im$	REAL
$1/x$	RECIP
REG	REG
REGT	REGT
RESULT	RESULT
RND	RND
R/S	RS
RTN	RTN
R up	RUP
SCI	SCI
SF	SF
SIN	SIN

SIN-1	SINI
SOLVE	SOLVE
x^2	SQR
\sqrt{x}	SQRT
Σ -	SSTAT
STO	STO
STK	STK
TAN	TAN
TAN-1	TANI
->DEG	TDEG
10^x	TENPOWX
TEST	TEST
->H	TH
->H.MS	THMS
->P	TP
->R	TR
->RAD	TRAD
USER	USER
X	X
$x > y$	XY
$x = 0$	XEZERO
$x \leq y$	XLEY
\hat{y}, r	YR

4. Examples

- [Math Calculation](#)
- [Statistics](#)
- [Matrix](#)
- [Trigonometric](#)
- [Number Formatting](#)
- [Flags](#)
- [Conditional Branching](#)
- [Conversions](#)
- [Clearing Registers](#)
- [Programming](#)
- [Looping](#)

Math Calculation

$3 + 5 = ?$

- Key in 3
- Press [ENTER]
- Key in 5
- Press [+].
- The result is 8.00

$(4+5i)(7-8i) = ?$

- Key in 4.
- Press [ENTER].
- Key in 5.
- Press [f] [I].
- Key in 7.
- Press [ENTER].
- Key in 8.
- Press [f] [I].
- Press [x].
- The result is -12.00 .Press [f] [(i)] and hold to display the imaginary part, 67.0000.

$(1 + 3)^7 = ?$

- Key in 1.
- Press [ENTER].
- Key in 3.
- Press [+].
- Key in 7.
- Press [y^x].
- The result is 16384.00.

$$\sqrt{9 - 8i} = ?$$

- Key in 9.
- Press [ENTER].
- Key in 8.
- Press [CHS].
- Press [f] [I].
- Press [\sqrt{x}].
- The result is 3.2436. Press [f] [(i)] and hold to display the imaginary part, -1.2332.

$$e^{2.1} = ?$$

- Key in 2.1.
- Press [e^x].
- The result is 8.1662.

$$\ln 12 = ?$$

- Key in 12.
- Press [g] [LN].
- The result is 2.4849.

$$14\% \text{ of } 300 = ?$$

- Key in 300.
- Press [ENTER].
- Key in 14.
- Press [g] [%].
- The result is 42.00.

$$\text{Calculate the Fractional part of } 12.4567$$

- Key in 12.4567.
- Press [f] [FRAC].
- The result is 0.4567.

$$\text{Calculate the Integer part of } 234.123$$

- Key in 234.123.
- Press [g] [INT].
- The result is 234.0000.

$$\text{Display the value of } \pi.$$

- Press [g] [π].
- The result is 3.1416.

Statistics

Find the mean and sample standard deviation for the following data:

26, 12, 23, 19, 20, 45.

- Press [f][Σ] to clear the statistical registers.
- Key in 26 then press [Σ+]
- Key in 12 then press [Σ+]
- Key in 23 then press [Σ+]
- Key in 19 then press [Σ+]
- Key in 20 then press [Σ+]
- Key in 45 then press [Σ+]
- Press [g][x] to calculate the mean, 24.1667.
- Press [g][s] to calculate the sample standard deviation, 11.2324.

For the following data, calculate. Estimate Y when X is 8.

X: 9 12 15 25 23

Y: 15 23 25 12 26

- Press [f][Σ] to clear the statistical registers.
- Key in 9 then press [ENTER].
- Key in 15 then press [Σ+].
- Key in 12 then press [ENTER].
- Key in 23 then press [Σ+].
- Key in 15 then press [ENTER].
- Key in 25 then press [Σ+].
- Key in 25 then press [ENTER].
- Key in 12 then press [Σ+].
- Key in 23 then press [ENTER].
- Key in 26 then press [Σ+].
- Press [f][L.R.] to calculate Linear Regression . the y intercept , 18.4282 .
- Press [x]<y] to get the Slope , -0.0806 .
- Key in 8 then press [f][ŷ, r] to calculate Y estimate, 17.7834.
- Press [x]<y] for the correlation coefficient , -0.0732 .

Calculate $P_{y,x}(12,5)$

- Key in 12 then press [ENTER].
- Key in 5 then press [f][$P_{y,x}$].
- The result is 95,040.0000.

Calculate $C_{y,x}(6,4)$

- Key in 6 then press [ENTER].
- Key in 4 then press [g][$C_{y,x}$].
- The result is 15.0000.

Calculate 12!

- Key in 12 then press [f][x!].
- The result is 479,001,600.0.

Generate a Random Number

- Press [f] [RAN#].
- The result is 0.7474.

Trigonometric

Calculate Cos(20.5°).

- Key in 20.5 then press [COS] , 0.9367.

Calculate Sin(2 + 5i).

- Key in 2 then press [ENTER].
- Key in 5 then press [f][I].
- Press [Sin].
- The result is 67.4789.
- Press [f][(i)] to display the imaginary part . -30.8794.

DEG, RAD, GRAD

- Press [g][DEG] for calculations in Degree mode.
- Press [g][RAD] for calculations in Radian mode.
- Press [g][GRAD] for calculations in Gradian mode.
- All Calculations involving complex numbers are done in Radian Mode.

Calculate Tanh(45)

- Key in 45.
- Press [f][HYP][TAN].
- The result is 1.0000.

Calculate Cosh⁻¹(7+6i).

- Key in 7 then press [ENTER].
- Key in 6 then press [f][I].
- Press [g][HYP⁻¹][COS] .
- The result is 2.9140.
- Press [f][(i)] to display the imaginary part 0.7115 .

Conversions

->DEG

Convert 2.3030 to Degree.

- Key in 2.3030.
- Press [g][->DEG] .
- The output is 131.9522.

->RAD

Convert 45° to radians to Degree.

- Key in 45.
- Press [f][->RAD] .
- The result is 0.7854.

->H

Convert 9 hours, 20 minutes, 15 seconds to decimal hours.

- Key in 9.2015.
- Press [g][->H] .
- The result is 9.3375.

->H.MS

Convert 1.1520 to hours, minutes and seconds.

- Key in 1.1520.
- Press [f][->H.MS] .
- The result is 1.0907 i.e. 1 hour 09 minutes and 07 seconds.

->R

Convert $5L36.87^\circ$ to Rectangular coordinates.

- Key in 5.
- Press [ENTER].
- Key in 36.87.
- Press [f][I].
- Press [f][->R]
- The result is 4.0000 now press [f][(i)] to see the imaginary part which is 3.0000.

->P

Convert $6.0033 + 6.0033i$ to polar coordinates.

- Key in 6.0033.
- Press [ENTER].
- Key in 6.0033.
- Press [f][1].
- Press [g][->P].
- The result is 8.4900 now press [f][(i)] to see the imaginary part which is 45.0000.

Matrix

Dimension Matrix A to 2x2 matrix

- Key in 2 then press [ENTER].
- Press [f][DIM][A].

Calculate the transpose of matrix B

$$\begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 9 \end{matrix}$$

- Key in 2 then press [ENTER]
- Key in 3
- Press [f][DIM][B]
- Press [f][USER] to enter user mode
- Press [f][MATRIX]1 to set row and column numbers to 1
- Press 1 [STO][B]
- Press 2 [STO][B]
- Press 3 [STO][B]
- Press 4 [STO][B]
- Press 5 [STO][B]
- Press 9 [STO][B]
- Press [RCL][MATRIX][B]
- Press [f][MATRIX]4 , Display shows B 3 2
- Now Recall the values in Matrix B
- Press [RCL][B] , Display shows 1
- Press [RCL][B] , Display shows 4
- Press [RCL][B] , Display shows 2
- Press [RCL][B] , Display shows 5
- Press [RCL][B] , Display shows 3
- Press [RCL][B] , Display shows 9

Multiply the above Matrix by 2 and store it in Result Matrix

- Press [f][RESULT][A]
- Press [RCL][MATRIX][B]
- Press 2[x], Display Shows A 3 2
- Press [f][USER] to enter user mode
- Press [f][MATRIX]1 to set row and column numbers to 1
- Press [RCL][A], Display shows 2
- Press [RCL][A], Display shows 8
- Press [RCL][A], Display shows 4
- Press [RCL][A], Display shows 10
- Press [RCL][A], Display shows 6
- Press [RCL][A], Display shows 18

Find the determinant of the following matrix C

$$\begin{matrix} 1 & 3 \\ 5 & 8 \end{matrix}$$

- Press 2 [ENTER]
- Press [f][DIM][C]
- Press [f][USER] to activate user mode
- Press [f][MATRIX]1 to set row number in R0 and column number in R1 to 1
- Press in 1 [STO][C]
- Press in 3 [STO][C]
- Press in 5 [STO][C]
- Press in 8 [STO][C]
- Press [RCL][MATRIX][C]. Display shows C 2 2
- Press [f][MATRIX]9. The determinant of C is -7.000.

Other Matrix Functions

[MATRIX][0]

Redimensions all Matrix as 0x0 matrix

[MATRIX][1]

Sets Row and column in Register 0 and Register 1 as 0.

[MATRIX][2]

Converts \mathbf{Z}^P to \mathbf{Z}^{\sim} .

[MATRIX][3]

Converts \mathbf{Z}^{\sim} to \mathbf{Z}^P .

[MATRIX][4]

Finds the transpose of matrix.

[MATRIX][5]

Does the multiplication of transpose of matrix in y-register with the matrix in the x-register.

[MATRIX][6]

Finds the residual matrix.

[MATRIX][7]

Finds the Row norm of matrix.

[MATRIX][8]

Finds the forbenius norm of the matrix.

[MATRIX][9]

Find the determinant of matrix.

Flags

SF

- Press [g] [SF] to set flag between 0-9

CF

- Press [g] [CF] to clear flag between 0-9

F?

- Press [g] [F?] to check if flag 0-9 set

Conditional Branching

Consists of both Direct and Indirect branching it follows the 'do if true' i.e. continue with next line if condition is true else skip next line

[Test][0]

Tests if value in X-register is not equal to zero ($x \neq 0$). Can also be used with complex numbers and Matrix descriptors.

[Test][1]

Tests if value in X-register is greater than zero ($x > 0$)

[Test][2]

Tests if value in X-register is less than zero ($x < 0$)

[Test][3]

Tests if value in X-register is greater than equal to zero ($x \geq 0$)

[Test][4]

Tests if value in X-register is less than equal to zero ($x \leq 0$)

[Test][5]

Tests if value in X-register is equal to value in Y - register. Can also be used with complex numbers and Matrix descriptors.

[Test][6]

Tests if value in X-register is not equal to value in Y - register. Can also be used with complex numbers and Matrix descriptors.

[Test][7]

Tests if value in X-register is greater than value in Y - register

[Test][8]

Tests if value in X-register is less than value in Y - register

[Test][9]

Tests if value in X-register is greater than equal to value in Y - register

x = 0

Tests if value in X-register is equal Zero. Can also be used with complex numbers and Matrix descriptors.

$x \leq y$

Tests if value in X-register is less than equal to value in Y – register

Number Formatting

FIX

- Press [f][FIX][0-9] to format the number in the display to the desired no of digits .

SCI

- Press [f] [SCI][0-9] to format the number in display to scientific format .

ENG

- Press [f] [ENG][0-9] to format the number in display to engineering format .

Clearing Registers

Σ

- Press [f][Σ] to clear the contents of the registers R2 to R7

PRGM

- Press [f][PRGM] to clear the Program Lines in Memory in Program mode
- Press [f][PRGM] to Position the Program on line no 0 in Run mode .

REG

- Press [f][REG] to clear all storage registers

PREFIX

- Press [f][PRFIX] to clear partially entered prefixes and display all the 10 digits in display .

MxCalc 15C Programming

GSB

Write a subroutine to calculate $4 + (5 * 8)$

- go to program mode and key in a subroutine by pressing [g][P/R]
- Press [f][LBL][D]
- Key in 5
- Press [ENTER]
- Key in 8
- Press in [x]
- Key in 4
- press in [+]
- Press [g][RTN]
- get out of program mode by pressing [g][P/R]
- Press [GSB][D] to execute the subroutine
- The display shows the calculated value as 44.0000 .

Solve

Calculate a root of $x^2 - 6x + 9 = 0$.

- go to program mode and key in a subroutine by pressing [g][P/R]
- Press [f][LBL][A]
- Key in 6
- Key in [-]
- Key in [x]
- Key in 9 [+]
- Press [g][RTN]
- get out of program mode by pressing [g][P/R]
- Key in 1 [Enter]
- Key in 4
- Press [f][SOLVE][A].
- The display shows the calculated root as 3.00.

Integration

Integrate $\text{Cos}(x) + 5$ from $x = 1$ to $x = 4$

- go to program mode and key in a subroutine by pressing [g][P/R]
- Press [f][LBL][A]
- Key in [Cos]
- Key in 5
- Key in [+]
- Press [g][RTN]
- get out of program mode by pressing [g][P/R]
- Key in 1 [Enter]
- Key in 4

- Press `[[f][f][A]`.
- The display shows the calculated root as 17.9968.

Looping

ISG

Write a program to compute $1 + 2 + 3 + 4 + \dots + 10$.

- Press `[g][P/R]`
- Press `[f][LBL][D]`
- Key in 0.01001 `[STO]0`
- Key in 0 `[STO]1`
- Press `[f][LBL][C]`
- Press `[RCL]0`
- Press `[g][INT]`
- Press `[STO][+]`1
- Press `[f][ISG]0`
- Press `[GTO][C]`
- Press `[RCL]1`
- Press `[g][RTN]`
- Press `[g][P/R]`
- Press `[f][D]` to run the program .
- The display shows the output as 55.0000

DSE

The following program computes $10 \times 9 \times 8 \times \dots \times 1$.

- Press `[g][P/R]`
- Press `[f][LBL][A]`
- Key in 10.00010 `[STO]0`
- Key in 1 `[STO]1`
- Press `[f][LBL][B]`
- Press `[RCL]0`
- Press `[g][INT]`
- Press `[STO][x]`1
- Press `[f][DSE]0`
- Press `[GTO][B]`
- Press `[RCL]1`
- Press `[g][RTN]`
- Press `[g][P/R]`
- Press `[f][A]` to run the program .
- The display shows the output as 3,628,800.000.

5. Functions Reference

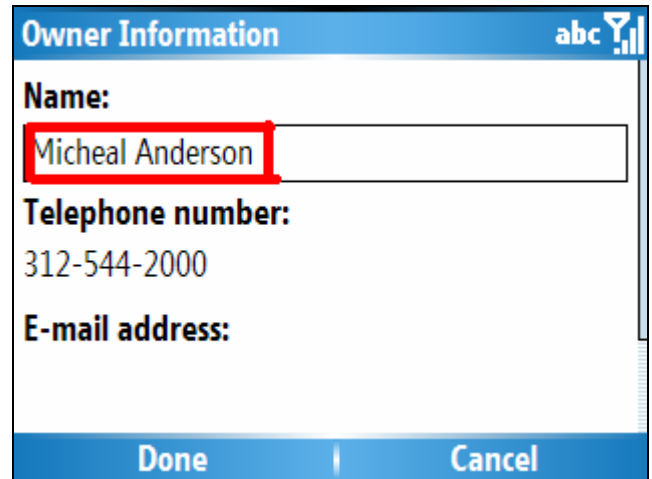
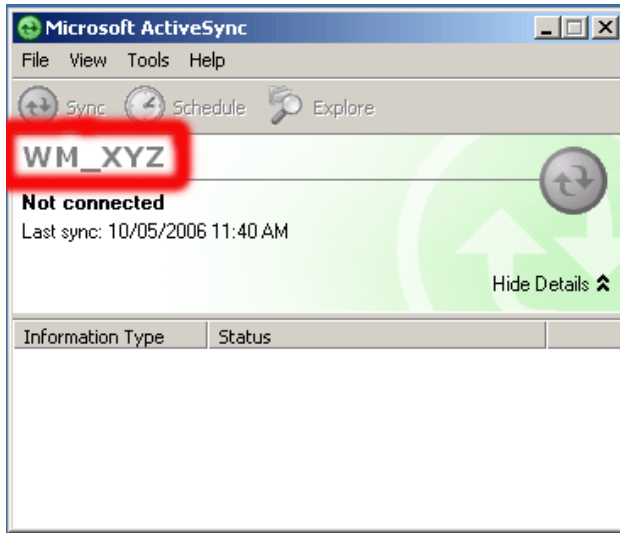
\sqrt{x}	Square Root.
x^2	Square.
10^x	Raise 10 to the power X
y^x	Power.
$1/x$	Reciprocal.
CHS	Change Sign.
LN	Natural Log.
LOG	Log to the base 10.
%	Percent of.
$\Delta\%$	Percent Change.
ABS	Absolute Value.
A,B,C,D,E	Labels used for Programming and Matrix.
0,1,2,...,9	Numbers.
LBL	Assign label.
SST	Single Step.
BST	Back Step.
HYP	Hyperbolic.
GTO	Goto label or line number.
HYP⁻¹	Inverse Hyperbolic.
DIM	Dimension Matrix.
(i)	Display imaginary part.
I	Index Register.
SIN	Sine.
COS	Cosine.
TAN	Tangent.
SIN⁻¹	Inverse Sine
COS⁻¹	Inverse Cosine..
TAN⁻¹	Inverse Tangent.
RESULT	Designate Result Matrix.
EEX	Exponential.
x >< y	Swap X and Y registers.
π	PI .
x><	Swap with registers.
DSE	Decrements and skips if equal to or less than.
ISG	Increments and skips if greater than.
SF	Set Flag.
CF	Clear Flag.
F?	Check Flag Set.
\int	Integration.
X=0	Check X=0.
X<=Y	Check X<=Y.
FIX	Fixed Number Format.
SCI	Scientific Number Format.
ENG	Engineering Number Format.
DEG	Degree.
RAD	Radian.
GRD	Gradian.
SOLVE	Solve and find root.
PSE	Pause.
R/S	Run/Stop.

P/R	Program/Run Mode.
Σ	Clear Registers.
GSB	Goto Subroutine.
RTN	Return.
PRGM	Clear Program.
R-down	Push registers Down.
R-up	Lift Registers.
REG	Clear registers.
RND	Round.
PREFIX	Clear Prefix.
<-	Backspace.
CLx	Clear X- register.
RAN#	Random number.
ENTER	Push number and terminate digit entry.
LSTx	Last X value.
f	shift f.
g	shift g.
FRAC	Fractional.
STO	Store
RCL	Recall.
INT	Integer part.
USER	User Mode.
->R	to Rectangular.
->H.MS	to Hours Minute seconds.
->RAD	to Radians.
->P	to Polar.
->H	to Hours.
->DEG	to Degree.
TEST	Test Conditions.
Re >< Im	Swap Real and imaginary X.
x!	Factorial.
x-BAR	Mean.
s	Standard Deviation.
\hat{y},r	Correlation Coefficient.
L.R.	Linear regression.
Py,x	Permutations.
Cy,x	Combinations.
$\Sigma+$	Add Subtract.
$\Sigma-$	Subtract Statistics.
+, -, x, \div	Arithmetic Operations.
EXIT	Exit Mxcalc 15c.
FRMT	Change between English and European format.
STK	Show Registers and stack values
HELP	Show MxCalc 15c Help.
REGT	Registration Form.

6. How to Register

To register you will need the ActiveSync ID. You can locate the ActiveSync ID as shown below.

In the example given below '**WM_XYZ**' is the ActiveSync ID. The serial # and tap on **Enter Key** button.



You can find the Active Sync ID from your Desktop where ActiveSync will be installed

To find the Owner Name Today's Screen or by clicking on **Settings-->Personal-->OwnerInformation -->Name**

If you have not set the owner name, please set it & supply when requested.

If you do not have the Microsoft ActiveSync software (Usually a CD is packaged in the Smartphone box) installed, please install it. To download visit the following page <http://www.microsoft.com/windowsmobile/activesync/default.mspx>

To Register MxCalc15 c please follows the following Steps:-

- Enter the key combinations [g] followed by [EXIT] (i.e. [g][EXIT]) to open the registration form.
 - Enter the registration code in the key input area.
 - Select 'Enter key' to complete your registration.
-