Calculator Handbook

by

David Miller

j.david.miller@nhmccd.edu
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## Calculator Handbook

### Basic Buttons

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<th>Function</th>
<th>Keystrokes</th>
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<tr>
<td><strong>Answer Button:</strong></td>
<td></td>
</tr>
<tr>
<td>• The last answer displayed is stored in memory as “Ans.”</td>
<td>Push 2nd (−)</td>
</tr>
<tr>
<td><strong>Clear Memory:</strong></td>
<td></td>
</tr>
<tr>
<td>• Clears the calculator memory. It will erase all programs, applications, and anything stored in memory.</td>
<td>Push 2nd + 7</td>
</tr>
<tr>
<td><strong>Display as a Fraction:</strong></td>
<td></td>
</tr>
<tr>
<td>• The calculator will display any rational decimal as a fraction.</td>
<td>Push MATH ENTER ENTER</td>
</tr>
<tr>
<td><strong>Entry:</strong></td>
<td></td>
</tr>
<tr>
<td>• Repreates the last entry line into calculator. Will return the last 30 entries if done repeatedly.</td>
<td>Push 2nd ENTER</td>
</tr>
<tr>
<td><strong>Graph/Table:</strong></td>
<td></td>
</tr>
<tr>
<td>• Will split the screen vertically between the Graph and Table to display both.</td>
<td>Push MODE Enter</td>
</tr>
<tr>
<td>• Scroll down and push “G-T” on</td>
<td></td>
</tr>
<tr>
<td><strong>Grid:</strong></td>
<td></td>
</tr>
<tr>
<td>• Will put a grid on the graphing window.</td>
<td>Push 2nd ZOOM Enter</td>
</tr>
<tr>
<td>• Scroll down and push “GridOn” on</td>
<td></td>
</tr>
<tr>
<td><strong>SplitScreen:</strong></td>
<td></td>
</tr>
<tr>
<td>• Will split the screen horizontally between the Homescreen, Table, or Graph.</td>
<td>Push MODE Enter</td>
</tr>
<tr>
<td>• Scroll down and push “Horiz” on</td>
<td></td>
</tr>
</tbody>
</table>
Checking Inequalities with “Tests”

Example Problem:
Solve: \( x - 2 \geq 7 \)

Solution:
\( x \geq 9 \)

Checking the solution:
\( 9 - 2 \geq 7 \)
\( 7 \geq 7 \)
True

Calculator Steps:

- Push \( 9 \), \( \text{STO} \), \( x,\theta,n \), \( \text{ENTER} \)
- Push \( x,\theta,n \), \( - \), \( 2 \)
- Push \( \text{2nd} \), \( \text{MATH} \), \( 4 \)
- Push \( 7 \), \( \text{ENTER} \)

If the calculator displays “1,” then it is “true.”
If the calculator displays “0,” then it is “false.”

Checking Ordered Pairs in Equations

Example Problem:
Determine if \((2, -3)\) is a solution of \( x - 4y = 14 \).

Solution:
\( (2) - 4(-3) = 14 \)
\( 2 + 12 = 14 \)
\( 14 = 14 \)
True
Checking “Simplify Problems” Using the Table

Example Problem:
Simplify $2(5x - 4) - 2$

Solution:
$10x - 10$

Calculator Steps:

- Push $\frac{2}{x}$ on the calculator
- Type the problem in $Y_1$
- Type the answer in $Y_2$
• Push \( \text{2nd} \) \( \text{GRAPH} \) to see the Table

\[
\begin{array}{|c|c|c|}
\hline
X & Y_1 & Y_2 \\
\hline
1 & 0 & 0 \\
2 & 10 & 10 \\
3 & 20 & 20 \\
4 & 30 & 30 \\
5 & 50 & 50 \\
6 & 50 & 50 \\
\hline
\end{array}
\]

\( X=1 \)

• If the two Y columns are the same, then the answer is correct.

---

Checking “Solve Problems” using the HomeScreen

Example Problem:
Solve: \( 3x - 4 = 2x + 1 \)

Solution:
\[ x = 5 \]

Calculator Steps:
• Store 5 to the calculator memory

\[
\begin{array}{|c|c|}
\hline
5 \to X & 5 \\
3X-4 & 11 \\
2X+1 & 11 \\
\hline
\end{array}
\]

• Push \( \text{5} \), \( \text{STO} \), \( \text{X,T,\theta,n} \), \( \text{ENTER} \)
• Push \( \text{3X}-4 \), \( \text{ENTER} \)
• Push \( \text{2X}+1 \), \( \text{ENTER} \)
• If the two answers match, then the answer is correct.
Checking “Solve Problems” using the Intersection Method

Example Problem:
Solve: \( x^2 = 4x + 5 \)

Solution:
\[ x = -1, \ x = 5 \]

Calculator Steps:

- Push \( Y= \)
- Type the left side of the problem in \( Y_1 \)
- Type the right side of the problem in \( Y_2 \)

**You have to see the graphs cross to get the answer!**

- Push \( \text{ZOOM} \)

- Adjust Window if needed
- Push \( \text{2nd \ Trace \ 5} \)

- If there’s more than one answer repeat the last step, but before pressing the third time use the left/right arrow keys to move the cursor close to the other answer and then push \( \text{Enter} \) the third time.

- The screen will say “Intersection” and below that it will say “X=” and the answer will be displayed.

---

**Evaluating Complex Numbers**

**Sample Problem:**

Write \( \frac{3 + 5i}{1 + i} \) in the form “a + bi”

**Solution:**

\( 4 + i \)
Calculator Steps:
Put calculator into Imaginary Mode

- Push **MODE**
- Scroll down and push **** on “a + bi”

Evaluate Functions using the Table

Example Problem:
Given $f(x) = x^2 - 3x + 2$, find $f(-3)$.

Solution:
$f(-3) = 20$
Calculator Steps:

- Push, \[ \text{Y} = \text{X,T,\theta,n} \]
  \[ x^2 \]
  \[ -3 \]
  \[ \text{X,T,\theta,n} \]
  \[ +2 \]
  \[ \text{ENTER} \]

- Push
- Scroll up or down until you find the appropriate x-value.

The value in the \( Y_i \) column will be the answer

Finding the Equation Given Two Points

Example Problem:
Find the slope given the points \((1,5),(3,1)\)

Solution:
Equation: \( y = -2x + 7 \)
Calculator Steps:

- Push
- Type in the ordered pairs (x’s in \( L_1 \), y’s in \( L_2 \))

- Push

“a” is the coefficient and “b” is the constant.

Finding the Slope Given Two Points

Example Problem:

Find the slope given the points \((1,5),(3,1)\)

Solution:

Slope = -2
Calculator Steps:

- Push STAT ENTER
- Type in the ordered pairs (x’s in L₁, y’s in L₂)

```
<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
```

LinReg

\[ y = ax + b \]

\[ a = -2 \]

\[ b = 7 \]

“a” is the slope.

Finding x-intercepts

Example Problem:

Find the x-intercepts for \( y = x^2 + 2x - 3 \)

Solution:

\((-3,0), (1,0)\)

Calculator Steps:

- Push \( Y= \) X,T,\( \theta \),n \( x^2 \) 2 X,T,\( \theta \),n - 3 ENTER
- Push 0 ENTER
• Push \( \text{GRAPH} \)

• You need to see all the x-intercepts on the graph to be able to find them.

• (Adjusting the Window might be needed.)

• Push, \( \text{2nd TRACE 5} \), \( \text{ENTER ENTER ENTER} \)

• To find the second x-intercept Push \( \text{2nd TRACE 5} \), \( \text{ENTER ENTER ENTER} \)

• Before pushing a 3\(^{rd}\) time push the arrows to the left or right to move the cursor close to the other x-intercept and then push \( \text{ENTER} \) the third time.

The screen will say Intersection and display the x- and y-coordinates.
Finding y-intercepts

Sample Problem:
Find the y-intercept for \( y = x^2 + 2x - 3 \)

Solution:
\((0, -3)\)

Calculator Steps:

- Push \( Y= \), \( 2 \), \( X,T,\theta,n \), \( x^2 \), \( -3 \), \( \text{ENTER} \)

- Push \( \text{2nd} \), \( \text{GRAPH} \)
- Scroll up/down using the arrows to the y-intercept
Graphing Inequalities

Sample Problem:
Graph the solution of the system of linear inequalities:
\[ y < 3x - 4 \]
\[ y \leq x + 2 \]

Solution:

Calculator Steps:

- Push \[ \text{Y=} \]
- Push \[ 3 \]
- Push \[ x,T,\theta,n \]
- Push \[ - \]
- Push \[ 4 \]
- Push \[ \text{ENTER} \]
- Push \[ x,T,\theta,n \]
- Push \[ + \]
- Push \[ 2 \]
- Push \[ \text{ENTER} \]
- Move the cursor to the left of \( Y_1 \) and push \[ \text{ENTER} \] 3 times.
- Move the cursor to the left of \( Y_2 \) and push \[ \text{ENTER} \] 3 times.
- Push \[ \text{GRAPH} \]
Graphing Lines

Example Problem:
Graph \( y = 3x - 2 \)

Solution:

Calculator Steps:

- Push
  - \( Y = \)
  - \( 3 \)
  - \( X,T,\theta,n \)
  - \(-\)
  - \( 2 \)
  - \( \text{ENTER} \)

- Push \( \text{GRAPH} \)
Graphing Non-Linear Equations

- Graph $y = x^3 - 3$
- Push $\text{Y=}$, $\text{X,T,Θ,n}$, $X^2$
- Push $\text{3}$, $\text{ENTER}$
- Push $\text{GRAPH}$

- Graph $y = |x - 2|$.
- Push $\text{Y=}$, $\text{2nd}$, $0$
- Push $\text{ENTER}$, $\text{X,T,Θ,n}$, $-$, $2$, $\text{)}$, $\text{ENTER}$
- Push $\text{GRAPH}$

- Graph $y = x^3$
- Push $\text{Y=}$, $\text{X,T,Θ,n}$, $\wedge$
- Push $\text{3}$, $\text{ENTER}$
- Push $\text{GRAPH}$
Higher Order Roots

Sample Problem:
Evaluate $\sqrt[3]{\frac{27}{64}}$

Solution:
$$\frac{3}{4}$$

Calculator Steps:

- Push $\boxed{3}$, MATH, $\boxed{5}$
  $\boxed{(}$, $\boxed{2}$, $\boxed{7}$, $\boxed{)}$, ENTER
- Push MATH, ENTER, ENTER

Plotting Ordered Pairs

Example Problem:
Plot: $(1,5), (3,1)$

Solution:
Calculator Steps:

- Push \( \text{STAT} \) \( \text{ENTER} \)

- Type in the ordered pairs (x’s in \( L_1 \) and y’s in \( L_2 \))

- Push \( \text{2nd} \) \( \text{Y=} \) \( \text{ENTER} \)
  - Select the options as pictured by using the arrows and the button.

- Push \( \text{WINDOW} \)
  - Select a Window that will display the ordered pairs.
Scientific Notation

Sample Problem:
Write $45,000,000,000$ in scientific notation.

Solution:

$$4.5 \times 10^{10}$$

Calculator Steps:
Put calculator in Scientific Mode

- Push

- Scroll right and push on “Sci”

- Push

- Push 45000000000,

- Push ENTER
Solving Systems by Graphing

Example Problem:
Given \( y = x + 1 \) and \( y = 2x - 1 \), find the solution to the system of equations.

Solution:
\((2,3)\)

Calculator Steps:

1. Push \( Y= \)
2. Push \( 1 \) \( \text{ENTER} \)
3. Push \( 2 \) \( \text{ ENTER} \)
4. Push \( \text{GRAPH} \)
5. You have to see the intersection on the graph to get the answer.
6. Push \( \text{2nd} \) \( \text{TRACE} \) \( 5 \)
7. The ordered pair will be stated on the screen.
Using Y= to Help with Factoring using Grouping or the Box

Sample Problem:
Factor \( 3x^2 + 13x - 10 \)

Solution:
\[(3x - 2)(x + 5)\]

Calculator Steps:
Goal: To find 2 numbers that have a product of -30 and a sum of 13.

1. Push, \( \text{Y=}, (\text{-}), 3 \)
2. Push \( \text{0}, \div, X,T,\theta,n, \text{ENTER} \)
3. Push \( \text{2nd}, \text{GRAPH} \)
4. Scroll up and down the table until you find 2 numbers that total 13.

These are the numbers needed to factor by grouping or to use the box.