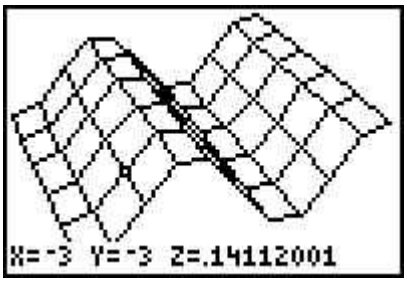
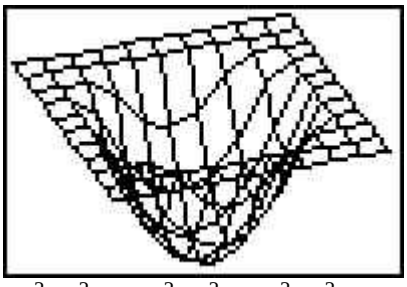
3D Graph Users Guide

This program can be **really** hard to use if you haven't read this guide first, so please read it while learning to use the program. **At least read the first chapter**.



$^{-}\sin(X^{r})$



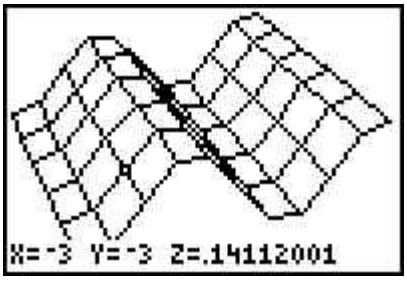
$((X^2+Y^2)<1)(X^2+Y^2)+((X^2+Y^2)>=1)1$

3D Graph is a program which can draw 3D graphs similar to those on the TI-92/89, on the TI-83.

***

Quickstart: Drawing a sinus graph

Write down the equation **$Z(X,Y)= {}^{-}\sin(X^{r})$**. Then change graph-range and viewing angle settings, calculate the graph, and graph it.



OK, here's how you do it:

1. Start the main program (**ADV3DGRP**), Press (**1**) to enter the **Z= EDITOR**.
2. Enter the equation **-sin(X^r)** on the **Z(X,Y)=** prompt. Press (**ENTER**)
3. Press (2) to enter the **GRAPH RANGE** menu. Press(**2**) to edit the graph range. Press the number for the var you want to edit. To edit the Xmin var press (**1**). Enter **-5**. Enter the following numbers: **Xmin=-5**, **Xmax=5**, **XGRID=10**, **Ymin=-5**, **Ymax=5**, **YGRID=5**. Finally press (**7**) to **RETURN** to the **GRAPH RANGE** menu. At the **GRAPH RANGE** menu press (**1**) to examine the vars. At last press (**4**) to return to the main menu.
4. Now it's time to change the viewing angle. Press (**3**) to enter the **VIEWING ANGLE** menu. Press (**4**) to reset the viewing angle vars to the standard values. This vill reset the vars and show the **VIEW VARS** screen to let you examine the vars. Press (**ENTER**) and (**5**) to return to the main menu.
5. And now it's time to do the calculations. Press (**4**) at the main menu to enter the **CALCULATE** menu. Since we want to do all the calculations this time just press (**4**). The calculations will start. At some point menu asking you whether the points should be plotted in **NORMAL** or **PERSPECTIVE** mode. Shoose **PERSPECTIVE**. The calculations will continue. This will take a looooooooong time.
6. When the calculations is done you will be returned to the main menu. Finally it's time to draw the graph, press (**5**) to draw it. The graph is drawn.
7. If you want to **TRACE** the graph press (**CLEAR**) to return to the home screen, followed by (**ENTER**) to restart 3D Graph. Now press (**6**) to **TRACE**. When you're done tracing the graph press (**ENTER**). Don't leave the calculator in trace mode, since this will drain your calculators batteries.

Return to the top of the page.

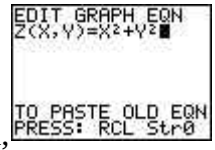
****

The Main Menu

This chapter will describes the options of the main menu, and what they are used for.

A description of the alternatives:

1:Z= EDITOR



This shows the **Z= EDITOR**, the Z= editor is similar to the Y= editor, which you reach when you press the (**Y=**) button on the keypad. The difference is that this time you enter a **Z** equation, which is depending on two variables (**X,Y**), instead of a **Y** equation depending on one (**X**) variable.
The equation is stored in **Str0**, make sure you haven't anything important stored there before using 3DGraph. If you want to paste the old equation to the **Z= EDITOR**, you can recall it to the Z= prompt. To do this press (**2nd**) (**RCL**) (**VARS**) (**7:String...**) (**0:Str0**) (**ENTER**).
You can save the equation to another string variable by entering **Str0->Str**X at the Home Screen, where **Str**X is any string variable between **Str1** to **Str9**.

2:GRAPH RANGE

This shows the **GRAPH RANGE** menu. The graph range menu lets you edit the graph range (surprise). See chapter 3 for more information.

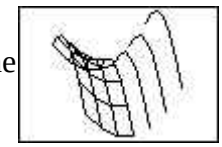
3:VIEWING ANGLE

This shows the **VIEWING ANGLE** menu. This menu works the same way as the graph range menu, exept this edits the angle from which the graph is seen. See chapter 4 for more information.

4:CALCULATE

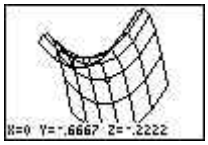
This shows the **CALCULATE** menu. Here you will find the routines for calculating the graph, this is required to be able to see any graph. See chapter 5 for more information.

5:GRAPH



Use this selection to draw the equation on the graph screen. The graph is drawn according to the current window range settings. Use the **4:CALCULATE/3:ZoomFit** option to set the window range to fit the graph. When the graph is drawn the program will exit. To redraw or trace the graph, goto the Home Screen by pressing (**CLEAR**) or (**2nd**) (**QUIT**). At the Home Screen press (**ENTER**) to re-run 3DGraph.
Using graph will turn off all other equations and plots.

6:TRACE



TRACE is used to trace the graph. This option works similar to the (**TRACE**) button on the keypad (which will **only** work on the built in graphs, **not** on 3D graphs). When pressing **TRACE** the marker will be centered somewhere around the center of the graph. Use the cursor keys to move the marker. **X**, **Y** and **Z** values will be shown at the bottom of the screen. Press (**ENTER**) to exit trace mode, this will also exit 3DGraph. To trace the graph again, re-run 3DGraph, as described above, and press **TRACE** again.
OBSERVE! Tracing a graph uses much battery power, don't leave the calculator in trace mode, this will drain the calculators batteries.
TRACE uses the picture variable **Pic0**.

7:EXIT

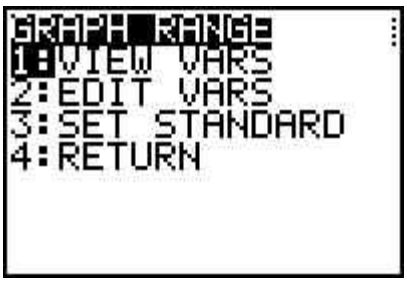
Well, you guess...

Return to the top of the page.

***

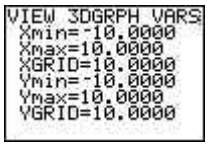
The Graph Range Menu

The Graph Range menu includes options which decides which part of the graph that is plotted, here you have a descrition of the options. The menu can be reached by pressing **2:GRAPH RANGE** in the Main Menu.



A description of the alternatives:

1:VIEW VARS



This option lets you examine the graph range variables. Press (**ENTER**) when your're done examining the vars.

2:EDIT VARS

From here you can edit the graph range vars. From the **EDIT GRAPH RANGE** menu select the var you want to edit. **XGRID** and **YGRID** decides the resolution of the graph. A **XGRID** value of **10** will create a graph consisting of **10 squares** on the **X-axis**. This means that there will be **11 grid lines** on that axis. The step between two lines can be calculated using this formula: **Xstep=(Xmax-Xmin)/XGRID**. The **XGRID** value must be a **positive integer** value **greater than 0**. If you enter **-8.7** as as **XGRID**, the - sign will be **omitted** and 8.7 will be **rounded** off to **9**.
Xmax must be greater than **Xmin** and **Ymax** must be greater than **Ymin**. If any of the values are illegal, an error message will be show **before** the **GRAPH RANGE** menu is shown when you **RETURN** to it.

3:SET STANDARD

Sets the standard graph range var values. These values are **Xmin=-10**, **Xmax=10**, **XGRID=10**, **Ymin=-10**, **Ymax=10**, **XGRID=10**.
This will create a graph range with X-values between -10 to 10 and Y-values between -10 and 10, with a grid size of 11x11 grid lines (10x10 squares).

4:RETURN

Returns to the Main Menu.

Return to the top of the page.

***

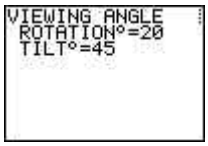
The Viewing Angle Menu

The options of this menu is used to set the angle from which the graph is viewed. The menu can be reached by pressing **3:VIEWING ANGLE** from the Main Menu.

A description of the alternatives:

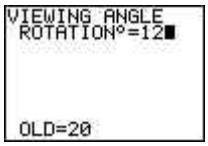
1:VIEW VARS

This option lets you examine the viewing angle variables. Press (**ENTER**) when your're done examining the vars.



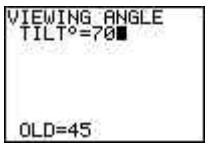
2:ROTATION

Sets the **ROTATION^{O}** variable. The graph is rotated around it's **Z** axis. The graph is viewed from above when rotated. the **ROTATION^{O}** is always expressed in degrees.



3:TILT

Sets the **TILT^{O}** var. Works the same as **ROTATION^{O}**, exept that this time the graph is rotated around the window's-**X**-axis towards the viewer.



4:SET STANDARD

Sets the standard values for **ROTATION^{O}** and **TILT^{O}**. The standard values are: **ROTATION^{O}=20** and **TILT^{O}=70**.

5:RETURN

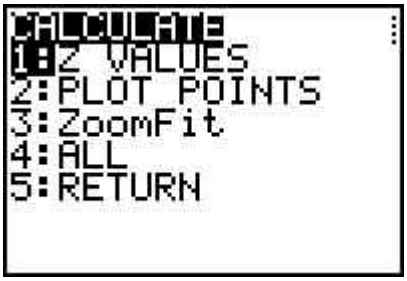
Returns to the Main Menu.

Return to the top of the page.

***

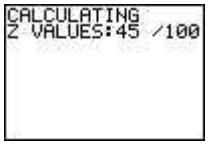
The Calculate Menu

Use this menu when you are done editing the equation and setting window range and viewing angle. To reach this menu, press **4:CALCULATE** at the Main Menu.



A description of the alternatives:

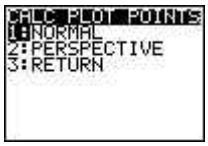
1:Z VALUES



Calculates all **Z** values corresponding to the **X** and **Y** values within the **GRAPH RANGE**. This **must** be done whenever the **Z=** equation is edited, or the **GRAPH RANGE** variables are changed.
When calculating the status is showed in percent done. (X /100, where X is percent done.) This calculation may take a while.
The Z values is stored in matrix **[J]**.

2:PLOT POINTS

This calculates the points on the screen between which the grid lines are drawn, the calculations are done corresponding to the current **VIEWING ANGLE**.



When pressing **PLOT POINTS** you will be presented with a menu prompting you to enter wheter you want the graph to be plotted in **NORMAL** or **PERSPECTIVE** mode.
In **NORMAL** mode all points are where X=5 and Y=5 is plotted on point 5,5 on the screen **whatever** depth (Z value) the point may have. Often this is the best mode, but when, for exampe, a graph is viewed from above (**ROTATION^{O}=0** and **TILT^{O}=0**) the Z values can not be seen visually at all.
In **PERSPECTIVE** mode the points are plotted with a perspective, points which are nearer the wiewer are moved to the

outer parts of the screen while points which are far away are moved nearer the center of the graph creating an illusion of depth. Sometimes this is the best way of viewing a graph, for example when viewing a graph from above, but in other cases the graph may look **really** wierd.
This calculation **must** be done whenever anyone of the **VIEWING ANGLE** vars is changed. You don't have to recalculate the **Z VALUES** after changing the **VIEWING ANGLE**, only the **PLOT POINTS**, and optionally **ZoomFit** needs to be recalculated. **PLOT POINTS must always** be recalculated when, and **after**, the **Z VALUES** are calculated.
When calculating the status is showed as percent done in the format X/100 where X=percent done.
The plot points are stored in the matrixes **[H]** and **[I]**.

3:ZoomFit

This calculates the **Window Range** to make it fit the whole graph. This works similar to **ZoomFit** and **ZoomStat** from the zoom menu which is showed when you press the (**ZOOM**) key. **ZoomFit** and **ZoomStat** from the built in **ZOOM** menu **can not** be used on a 3D graph.
After using **ZoomFit** you might want to use the **ZSquare** from the built in **ZOOM** menu to make the scale correct when graphing.

4:ALL

This makes all three calculations in order. after the **Z VALUES** are calculated the **CALC PLOT POINTS** menu is showed, select the preferred plot mode as described above. This option is implemented to make it easier to calc all values when you have changed the equation and/or the vars.
This also makes it easier for people which are not yet comfortable with the other calculation options.

5:RETURN

Returns to the Main Menu.

Return to the top of the page.

***

About 3DGraph

This program is programmed by Nicklas Larsson, it is FreeWare and may be copied and/or edited freely.

3D Graph is programmed by Nicklas Larsson.
Any comments on the program, or users maual can be sent by e-mail to nicklas.larsson@goteborg.mail.telia.com or nl@linux.nu . You can write in Swedish or English.

I'm sorry for all misspellings, and/or all other faults that may be in this Guide, but English isn't my first language.

The program is (of course) FreeWare and may be copied and/or edited freely. It only seems ridiculus to charge for calculator programs, in my opinion.

If you edit the program, please keep my copyright notice at the exit of the program, along with your own.

The 3D Graph consists of the following files:

ADV3DGRP	The main program, all menus and prompts are located here.
Z3DGCALP	The **PLOT POINTS** calculating routine.
Z3DGCAL	The **Z VALUES** calculating routine.
Z3DGGRPH	The **GRAPH** routine.
Z3DGTRCE	The **TRACE** routine.
Z3DGZFIT	The **ZoomFit** routine.

Return to the top of the page.