SPECIAL NOTES

1. The program originally facilitated up to 2 separate equations, however, due to screen size and resolution limitations, plotting more than 1 graph at a time produced poor picture quality. This feature can be easily added again for any number of equations.

2. Via the Link Software, one may take advantage of a PC speed and generate the graphs on a PC and down load the pictures for a classroom demonstration. It appears that the TI-85 is operating at about 4 MHz clock speed whereas an inexpensive 386PC easily runs at 20 MHz and a 486PC, above 50MHz. Imagine the benefits of using a PC versus 85 to do graphing and download the images for a classroom presentation.

3. 4.4K RAM required for full program to run, although, any single module may be run in approximately 400 bytes.

FEATURES:

1. Left & Right Handed coordinate systems
2. Cartesian, Spherical, and Cylindrical coordinate systems.
3. All equations in #2 may be entered as Z^2 or Z, ρ^2 or ρ, r^2 or r.
4. Zoom Sqr, Zoom Fit, Zoom In, Zoom Out options included.
5. Tilt X or Y axis at -135^o, -45^o, $+45^o$, -90^o or user input custom tilt.
6. Rotate the image about the XY Plane at any specified rotation angle.
7. Program automatically detects and adjusts for cylinders & planes if any variables are missing in the equation.
8. Totally menu driven.
9. View the graph with new options or zoom options without re-keying in the equation over and over again.
10. Accuracy and speed (resolution) controlled by setting appropriate axis size and increments.
11. All angular values entered are in radians unless otherwise stated by the program.
12. Standard (default) increment or custom increment for specified range values included.

PROGRAM DEMONSTRATION

Type **DEMO** and press enter to continue. Follow the attached equation descriptions for

each picture and press enter to continue for the next equation and picture.

1) Hyperbolic Paraboloid (Saddle)

$$Z = \frac{Y^2}{16} - \frac{X^2}{9}$$

entered as: $Z = Y^2/16 - X^2/9$

$-10 < (X \& Y) < 10$, X & Y inc = 0.4
Right Handed Cartesian coordinates, Zoom Fit.
Tilt for X = -135^o and Axis size = 10

2) Same as #2 above except that the image is rotated 90^o

3) Plane

$(X - 2) + (Y - 3) + (Z - 4) = 0$

entered as: $Z = 4 - ((X - 2) + (Y - 3))$

$-5 < (X \& Y) < 5$, X & Y inc = 0.3
Right Handed Cartesian coordinates, Zoom Fit.
Tilt for X = -135^o and Axis size = 5

4) Cone in Cartesian

$Z = \sqrt{}(X^2 + Y^2)$

entered as same

$-5 < (X \& Y) < 5$, X & Y inc = Standard
Right Handed Cartesian coordinates, Zoom Fit.
Tilt for X = -135^o and Axis size = 5

5) Cone in Cylindrical Coordinates

$r = Z$
entered as same.

$0 < \theta < 2\pi$, $0 < Z < 5$, inc. for both = 0.3

Right Handed Cylindrical coordinates, Zoom Sqr.
Tilt for X = -135^{o} and Axis size = 6

6) Full Sphere

$\rho = 5$

entered as same

$0 < \phi < \pi$, $0 < \theta < 2\pi$, ϕ inc = 0.1 , θ inc = standard.
Right Handed Spherical coordinates, Zoom Sqr.
Tilt for X = -135^{o} and Axis size = 7

7) 1st Octant Sphere

same as above except that both angles (ϕ and θ) vary from 0 to $\pi / 2$

8) Paraboloid opening on Z in Cartesian coordinates

$Z = X^2 + Y^2$

entered as same

-5 < (X & Y) < 5 , increment for both = 0.5
Right Handed Cartesian coordinates, Zoom Fit.
Tilt for X = -135^{o} and Axis size = 5

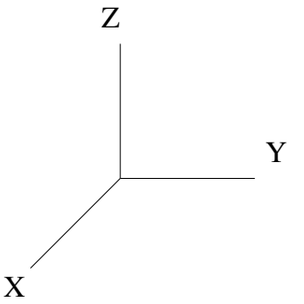
9) Paraboloid opening on Z in Cylindrical coordinates

$r^2 = Z$

entered as: $r = \sqrt{Z}$

$0 < \theta < 2\pi$, $0 < Z < 5$, θ inc = 0.5 , Z inc = 0.2
Right Handed Cylindrical coordinates, Zoom Sqr.
Tilt for X = -135^{o} and Axis size = 5

10) Paraboloid opening on +X axis in cartesian coordinates

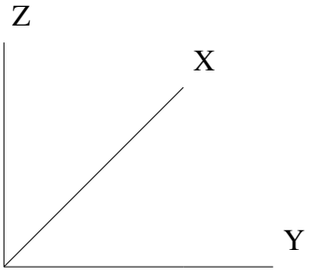


$Z^2 = X - Y^2$

entered as: $Z = \pm \sqrt{\ }(X - Y^2)$

$-5 < (X \& Y) < 5$, inc for both = 0.2
Right Handed Cartesian coordinates, Zoom Fit
Tilt for X = -135^o and Axis size = 5

11) Paraboloid opening on +X axis in cartesian coordinates with different tilt



Same as #9 except that the tilt for X is 45^o versus -135^o .
Also the X & Y increment is 0.1 versus 0.2
Note the difference in resolution due to change increment.
The graph is more accurate this way.

12) 4 Rose petals

$r = 2 \cos 2\theta$

entered as same

$0 < \theta < 2\pi$, $0 < Z < 2$, θ inc = 0.2 , Z inc = 0.2
Right Handed Cylindrical coordinates, Zoom Fit
Tilt for X = -135^o and Axis size = 2

13) Equation taken from a Howard Anton Calculus book

$Z = |X| \ |Y|$

entered as: Z = (abs X) * (abs Y)

$-3 < (X \& Y) < 3$, increment for both = 0.3
Right Handed Cartesian coordinates, Zoom Fit.

Tilt for X = -45^{o} and Axis size = 3

14) Equation taken from a Howard Anton Calculus book

$$Z = \frac{1}{(X^2 + Y^2)}$$

entered as: $Z = 1 / (X^2 + Y^2)$

-3 < (X & Y) < 3 , increment for both = 0.3
Right Handed Cartesian coordinates, Zoom Fit.
Tilt for X = -135^{o} and Axis size = 3

15) Equation taken from a Howard Anton Calculus book

$Z = \text{Sin } \sqrt{\ }(X^2 + Y^2)$

entered as same

-20 < (X & Y) < 20 , increment for both = 1
Right Handed Cartesian coordinates, Zoom Fit.
Tilt for X = -135^{o} and Axis size = 20

16) Circular Cylinder

r = 5

entered as same

$0 < \theta < 2.5\pi$, 0 < Z < 5 , θ inc = 0.4 , Z inc = 0.3
Right Handed Cylindrical coordinates, Zoom Fit
Tilt for X = -135^{o} and Axis size = 6

17) Sinusoidal cylinder in left handed cartesian coordinate system

Z = sin X

entered as same

-7 < (X & Y) < 7 , X & Y increment = standard
Left Handed Cartesian coordinates, Zoom Sqr
Tilt for X = -135^{o} and Axis size = 7

18) Same as #17 in right handed coordinates

19) Same as #17 except Z = sin Y versus Z = sin X ; left handed coordinate system

20) Same as #17 except Z = sin Y versus Z = sin X ; right handed coordinate system

Quadric Surface

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