Guide for Quadric Surfaces

Surface	Graph	Equation	Description of Equation
Plane		$ax + by + cz = d$	All three variables are first degree.
Cylinder		Possible example: $y = f(x)$	One of the variables is missing.
Ellipsoid		$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$	All variables are squared and have the same sign (usually positive).
Paraboloid		$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = \dfrac{z}{c}$	Two variables squared and with the same sign and the other variable is first degree.
Cone		$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} - \dfrac{z^2}{c^2} = 0$	All three variables squared. Two have the same sign and the third has the opposite different sign. The constant on the right is 0.
Hyperboloid of One Sheet		$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} - \dfrac{z^2}{c^2} = 1$	All three variables are squared. With a positive constant on the right, two of the variables are positive and one is negative.
Hyperboloid of Two Sheets		$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} - \dfrac{z^2}{c^2} = -1$	All three variables are squared. With a positive constant on the right, two of the variables are negative and one is positive.
Hyperbolic Paraboloid		$\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = \dfrac{z}{c}$	Two variables are squared and have the opposite signs and the other variable is first degree.

Typical Command for WolframAlpha

The following command will graph a hyperboloid of two sheets similar to the one shown above:

ContourPlot3D[x^2+y^2/4-z^2==-1, {x,-4,4},{y,-8,8},{z,-3,3}]

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