Quadrics

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Definition of a quadric

- A Quadric surface is the graph of a second degree equation of 3 variables
  - $Ax^2 + By^2 + Cz^2 + Dxy + Eyz + Fxz + Gx + Hy + Iz + J = 0$
- We will look at the simpler form without the cross terms
  - $Ax^2 + By^2 + Cz^2 + Gx + Hy + Iz + J = 0$
- For example, $f(x, y) = x^2 + y^2$ is a parabaloid

Conic sections

- Because we are looking at squared variables in out equations, conic sections are very important

circle	$r^2 = x^2 + z^2$
ellipse	$1 = \frac{x^2}{a^2} + \frac{y^2}{b^2}$
parabola	$y = x^2$
hyperbola, horizontal	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$
hyperbola, vertical	$\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$