Lecture IV Notes

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0.1 The Distance From a Point to a Plane

The distance from any point to a plane may be found using the formula $\frac{|ax+by+cz+d|}{\sqrt{a^2+b^2+c^2}}$, where a-d are the coefficients of the equation of the plane, and x-z are the coordinates of the point.

0.2 The Distance From a Plane to a Plane

Find one point on either plane, and repeat the process to find a distance from a point to a plane.

1 Cylinders and Quadric Surfaces

The equation of a quadric surface is given by the equation: $Ax^2+By^2+Cz^2+Dxy+Eyz+Fxz+Gx+Hy+Iz+J$, where A-J are constants.

There are six different figures that should be known:

Figure	Equation
Ellipsoid: A Figure in Which All Traces are Ellipses	$\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$
Cone: A Figure in Which Horizontal Traces are Ellipses and Vertical Traces in x and y are Hyperbolas	$\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{z^2}{c^2}$
Elliptic Paraboloid: Horizontal Traces are Ellipses and Vertical Traces are Parabolas	$\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{z}{c}$
Hyperboloid of One Sheet: Horizontal Traces are Ellipses and Vertical Traces are Hyperbolas	$\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$
Hyperbolic Paraboloid: Horizontal Traces are Hyperbolas and Vertical Traces are Parabolas	$\frac{x^2}{a^2}-\frac{y^2}{b^2}=\frac{z}{c}$
Hyperboloid of Two Sheets: Horizontal Traces are Ellipses in z and Vertical Traces are Hyperbolas	$-\frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$