

Analytic Geometry

Lines

general:	$Ax + By + C = 0$
point-slope:	$y - y_1 = m(x - x_1)$
slope-intercept:	$y = mx + b$

Circles

A circle is the set of points in \mathbb{R}^2 equidistant from a center point.

$$\begin{aligned}d &= 2r \\c &= \pi d \\A &= \pi r^2\end{aligned}$$

A circle as points in the xy plane with center at (a, b) and radius r is given by:

$$C = \{(x, y) : (x - a)^2 + (y - b)^2 = r^2\}$$

A circle as vector specified points in the $\mathbf{i}\mathbf{j}$ plane with center at \mathbf{x}_0 and radius r is given by:

$$\begin{aligned}C &= \{\mathbf{x} : |\mathbf{x} - \mathbf{x}_0| = r\} \\&= \{\mathbf{x}_0 + r(\mathbf{i} \cos t + \mathbf{j} \sin t), 0 \leq t < 2\pi\}\end{aligned}$$

Triangles

$$\begin{aligned}p &= a + b + c \\A &= \frac{ah}{2} \\A &= \sqrt{s(s-a)(s-b)(s-c)} \\&\text{where } s = \frac{a+b+c}{2}\end{aligned}$$

Conic Sections

Tangent Plane to Surface

Given surface $f(x, y)$, the tangent plane at the point (x_0, y_0) is given by:

$$z = f(x_0, y_0) + \frac{\partial f}{\partial x}(x_0, y_0)(x - x_0) + \frac{\partial f}{\partial y}(x_0, y_0)(y - y_0)$$

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