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.

$$d = 2r$$
$$c = \pi d$$
$$A = \pi r^2$$

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

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

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

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

Triangles

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

Conic Sections

Tangent Plane to Surface

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

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

J. Rugis
Maraetai, New Zealand