

## Point to Plane Distance

A Plane may be defined as:

$$Ax + By + Cz + D = 0$$

Where, given 3 Points on that Plane  $(x_1, y_1)$ ,  $(x_2, y_2)$  &  $(x_3, y_3)$ :

$$A = y_1(z_2 - z_3) + y_2(z_3 - z_1) + y_3(z_1 - z_3)$$

$$B = z_1(x_2 - x_3) + z_2(x_3 - x_1) + z_3(x_1 - x_2)$$

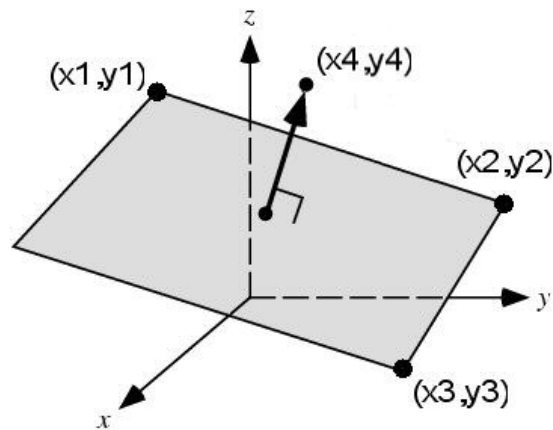
$$C = x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)$$

$$-D = x_1(y_2z_3 - y_3z_2) + x_2(y_3z_1 - y_1z_3) + x_3(y_1z_2 - y_2z_1)$$

Then,

$$D = -1(-D)$$

### **Diagram**



The perpendicular distance from a Point  $(x_4, y_4)$  to this Plane may be given as:

$$\frac{A(x_4) + B(y_4) + C(z_4) + D}{\sqrt{A^2 + B^2 + C^2}}$$