Distance between lines

$$d(r,r_1)=\frac{\begin{vmatrix} a-a_1 & b-b_1 & c-c_1 \\ l & m & n \\ l_1 & m_1 & n_1 \end{vmatrix}}{\sqrt{\begin{vmatrix} m & n \\ m_1 & n_1 \end{vmatrix}^2+\begin{vmatrix} l & n \\ l_1 & n_1 \end{vmatrix}^2+\begin{vmatrix} l & m \\ l_1 & m_1 \end{vmatrix}^2}}\ Q\equiv(a,b,c)\ Q_1\equiv(a_1,b_1,c_1)$$

Where $r =< \vec{a}(l,m,n) >$ and $r_1 =< \vec{a_1}(l_1,m_1,n_1) >$ passing through Q and Q_1

Common perpendicular between two lines

$$\begin{vmatrix} X-a & Y-b & Z-c \\ \beta_1 & \beta_2 & \beta_3 \\ l & m & n \end{vmatrix}=0$$

$$\begin{vmatrix} X-a_1 & Y-b_1 & Z-c_1 \\ \beta_1 & \beta_2 & \beta_3 \\ l_1 & m_1 & n_1 \end{vmatrix}=0$$

Where $< \beta_1,\beta_2,\beta_3 >=< \vec{a}\wedge\vec{a_1} >$

Distance between a plane and a point

$$d(P_0,\pi)=\frac{|Ax_0+By_0+Cz_0+D|}{\sqrt{A^2+B^2+C^2}}\ P_0\equiv(x_0,y_0,z_0)$$

Distance between a point and a line

$$d(P_0,r)=\frac{\begin{vmatrix} y_0-b & z_0-c \\ m & n \end{vmatrix}^2+\begin{vmatrix} x_0-a & z_0-c \\ l & n \end{vmatrix}^2+\begin{vmatrix} x_0-a & y_0-b \\ l & m \end{vmatrix}^2}{\sqrt{l^2+m^2+n^2}}\ P_0\equiv(x_0,y_0,z_0)$$

Angle between two planes

$$\cos\varphi=\frac{< n,n_1 >}{\|n\|\,\|n_1\|}=\frac{AA_1+BB_1+CC_1}{\sqrt{A^2+B^2+C^2}\sqrt{A_1^2+B_1^2+C_1^2}}$$

Angle between a line and a plane

$$\sin\varphi=\frac{Al+Bm+Cn}{\sqrt{A^2+B^2+C^2}\sqrt{l^2+m^2+n^2}}$$