

វិធី 1: ម៉ាទីម៉ាទិក

Formula

The distance d between a point $P_0(x_0, y_0, z_0)$ and the plane

$$d = \frac{|Ax_1 + By_1 + Cz_1 + D|}{\sqrt{A^2 + B^2 + C^2}}$$

$$d = \frac{|3(2) - 1 + 4(-3) - 1|}{\sqrt{3^2 + (-1)^2 + 4^2}} = \frac{|-8|}{\sqrt{26}} = \frac{8}{\sqrt{26}} = \frac{4\sqrt{26}}{13} \#$$

Find the shortest distance from the point $p_1 = \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix}$ to the plane given by

$$3x - y + 4z - 1 = 0$$

Normal vector of plane គឺ $\begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix}$

ចំណុចលើ plane គឺជា $\bullet$ ណាមួយ

ឆ្លើយ ឲ្យយើង line គឺជា $\bullet$ ឆ្លើយ direction vector ឲ្យយើង

$$\therefore p(t) = \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix} + \begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix} t \rightarrow \text{បំប្លែង plane equation ឲ្យយើង}$$

$$3(2+3t) - (1-t) + 4(-3+4t) - 1 = 0$$

$$3(2+3t) - (1-t) + 4(-3+4t) = 1$$

$$6+9t-1+t-12+16t = 1$$

$$26t - 7 = 1$$

$$26t = 8$$

$$t = \frac{4}{13}$$

$$\therefore \text{Intersection point: } p\left(\frac{4}{13}\right) = \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix} + \begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix} \left(\frac{4}{13}\right) = \begin{pmatrix} 38/13 \\ 9/13 \\ -23/13 \end{pmatrix}$$

$\therefore$ Distance between two points

$$\left| \bullet - \bullet \right| = \left| \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix} - \begin{pmatrix} 38/13 \\ 9/13 \\ -23/13 \end{pmatrix} \right|$$

$$= \left| \begin{pmatrix} -12/13 \\ 4/13 \\ -16/13 \end{pmatrix} \right|$$

$$= \sqrt{\left(\frac{-12}{13}\right)^2 + \left(\frac{4}{13}\right)^2 + \left(\frac{-16}{13}\right)^2}$$

$$= \frac{4\sqrt{26}}{13} \#$$

