

THE DISTANCE FROM A POINT TO A REAL PLAN

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1. Let be $A(2, 1, 3)$ and the real plan:

$$P : 3x + 4y + 5z - 10 = 0$$

Find the distance from A to P .

$$\begin{aligned}d(A, P) &= \frac{|3x_A + 4y_A + 5z_A - 10|}{\sqrt{3^2 + 4^2 + 5^2}} \\d(A, P) &= \frac{|3 \cdot 2 + 4 \cdot 1 + 5 \cdot 3 - 10|}{\sqrt{9 + 16 + 25}} = \frac{|6 + 4 + 15 - 10|}{\sqrt{50}} \\d(A, P) &= \frac{15}{5\sqrt{2}} = \frac{3}{\sqrt{2}} = \frac{3\sqrt{2}}{2}\end{aligned}$$

2. Let be $A(1, 1, 0)$; $B(0, 1, 0)$; $C(0, 1, 1)$; $D(8, 8, 8)$.
Find the distance from D to the real plan (ABC) .

$$(ABC) : \begin{vmatrix} x & y & z & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 1 \end{vmatrix} = 0$$

$$(ABC) : \begin{vmatrix} x & y-1 & z-1 & 0 \\ 1 & 0 & -1 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 1 & 1 \end{vmatrix} = 0$$

$$(ABC) : \begin{vmatrix} x & y-1 & z-1 \\ 1 & 0 & -1 \\ 0 & 0 & -1 \end{vmatrix} = 0$$

$$(ABC) : y - 1 = 0$$

$$d(D, (ABC)) = \frac{|8 - 1|}{\sqrt{1^2 + 0^2 + 0^2}} = 7$$

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