S 282 Nr. 8

a) $S_1(3|0|0)$ $S_2(0|3|0)$ $S_3(0|0|4)$ $P(4|5|7)$

$E: \frac{x_1}{3} + \frac{x_2}{3} + \frac{x_3}{4} = 1 \Rightarrow 4x_1 + 4x_2 + 3x_3 = 12$

$g \perp E \wedge P \in g$

$g: \vec{x} = \begin{pmatrix} 4 \\ 5 \\ 7 \end{pmatrix} + t \begin{pmatrix} 4 \\ 4 \\ 3 \end{pmatrix}$; $g \cap E$ $4(4+4t) + 4(5+4t) + 3\cdot(7+3t) = 12$

$16 + 16t + 20 + 16t + 21 + 9t = 12$

$41t = -45$

$t = -\frac{45}{41}$

$\vec{OF} = \begin{pmatrix} 4 \\ 5 \\ 7 \end{pmatrix} - \frac{45}{41} \begin{pmatrix} 4 \\ 4 \\ 3 \end{pmatrix}$; $d = |\vec{PF}| = \sqrt{\left(-\frac{16}{41} - 4\right)^2 + \left(\frac{25}{41} - 5\right)^2 + \left(\frac{152}{41} - 7\right)^2}$

$d = \sqrt{\frac{2025}{41}} = \frac{45}{\sqrt{41}}$

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b) $h \perp E_2 \wedge Q(5|8|-9) \Rightarrow h: \vec{x} = \begin{pmatrix} 5 \\ 8 \\ -9 \end{pmatrix} + t \begin{pmatrix} 2 \\ 3 \\ -4 \end{pmatrix}$

$E_2 \cap h = \{F\}$; $E_2: 2x_1 + 3x_2 - 4x_3 = 12 \Leftrightarrow \frac{x_1}{6} + \frac{x_2}{4} - \frac{x_3}{3} = 1$

$2(5+2t) + 3(8+3t) - 4(-9-4t) = 12$

$10 + 4t + 24 + 9t + 36 + 16t = 12$

$29t = 12 - 70 = -58$

$t = \frac{-58}{29} = -2$

$\vec{OF} = \begin{pmatrix} 5 \\ 8 \\ -9 \end{pmatrix} - 2 \begin{pmatrix} 2 \\ 3 \\ -4 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$; $F(1|2|-1)$ $S_1(6|0|0)$ $S_2(0|4|0)$ $S(0|0|-3)$