

$(O, \vec{i}, \vec{j}, \vec{k})$ (\mathcal{L})

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$(\mathcal{P}): x - y + 3z = 0$

$A(1, -1, 3)$

 (OA)

$$\begin{cases} x = t \\ y = -t, t \in \mathbb{R} \\ z = 3t \end{cases} \quad (1)$$

 $A(OA)$ (\mathcal{R})

(

(2006/2005)

 (\mathcal{R}) (\mathcal{P})

(

 (\mathcal{P}) A (\mathcal{R}) (S)

(2)

 $\sqrt{33}$ O (Γ)

$c = 3a \quad b = -a$

 (OA) (S) $\Omega(a, b, c)$

(

$a - b + 3c = -11$

$\Omega A^2 - \Omega O^2 = 33 :$

(

$2\sqrt{11} \quad (S)$

 Ω

(

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$C(6, 3, -3) \quad B(5, 2, 2) \quad A(4, 4, 1)$

$R = \sqrt{14}$

$\Omega(2, -1, 3)$

 (S)

(

(2009 / 2008)

$\overline{AB} \wedge \overline{AC}$

(1)

 (ABC)

$3x + 2y + z - 21 = 0$

(2)

 (S) (ABC)

(3)

 $(ABC) \quad (S)$

(

 (S)

(4)

 $d(\Omega, (\Delta))$

$$(\Delta) \begin{cases} x = 5 - t \\ y = 2t \\ z = 3t + 1 \end{cases} ; t \in \mathbb{R} :$$

(5)

 $(S) \quad (\Delta)$

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. 2

$\Omega(2, 3, -1)$

 (S)

(1)

 (P) Ω

$(P): 2x - y + 2z - 5 = 0$

(2)

(02/03)

 (P) (S) A

(3)

$\overline{B\Omega} \wedge \overline{V}$

$\overline{V}(-1, 0, 1)$

$B(3, 4, 0)$

(4)

 \overline{V} B (Δ) Ω

(5)

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(2009 / 2008)

$D(0, 1, -1) \quad C(2, -1, 0) \quad B(6, 6, 0) \quad A(-2, 2, 8) :$

$\overline{MA} \cdot \overline{MB} = 0$

 M (S)

$(OCD): x + 2y + 2z = 0 :$

$\overline{OC} \wedge \overline{OD}$

(1)

. 6

$\Omega(2, 4, 4)$

 (S)

(2)

 (S) (OCD) (OCD) Ω

(3)

 $(OCD) \quad (S)$ O

$\overline{OA} \cdot \overline{OB} = 0$

(4)

بالتوفيق

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()

$$\vec{w}\left(\frac{4}{9}, \frac{8}{9}, -\frac{1}{9}\right) \quad \vec{v}\left(\frac{4}{9}, -\frac{1}{9}, \frac{8}{9}\right) \quad \vec{u}\left(\frac{7}{9}, -\frac{4}{9}, -\frac{4}{9}\right) \quad (1)$$

 $(\vec{u}, \vec{v}, \vec{w})$

$$(S_m): x^2 + y^2 + z^2 - 2mx - 2y + 2mz + m^2 - m + 3 = 0 \quad (2)$$

 (S_m) m

$$B(4, 1, 1) \quad A(3, 1, -2) \quad (\Delta): \begin{cases} x = -1 + 6t \\ y = 6 - 5t \\ z = 1 - 2t \end{cases} t \in \mathbb{R} \quad (3)$$

 $(\Delta) \quad (AB)$

$$C(2; 0; 0) \quad B(3; -2; 1) \quad A(1; 0; 1) \quad (4)$$

 C ABC

$$B(-1, 0, 1) \quad A(-1, 1, 0) \quad (5)$$

$$\mathbb{R} \quad m \quad (P_m): mx - y - z + m + 1 = 0 \quad (AB) \quad ($$

 $(P_m) \perp (P_1)$ m

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(2007 / 2006)

$$(P): x - y + 2z + 1 = 0 \quad (S): x^2 + y^2 + z^2 - 2x - 4y - 6z + 8 = 0$$

 $\sqrt{6}$ $\Omega(1, 2, 3)$ (S)

(1)

 (S) (P)

(2)

 (P) Ω (Δ)

(3)

 $(S) \quad (P)$ ω

(

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$\vec{n}(2, 1, 2)$

$A(-2, 1, -3)$

 (P)

$\vec{u}(2, 2, -3)$

$A'(1, -3, 5)$

 (Δ) (P)

$\Omega(1, -2, 0)$

(1)

 (P) (S) B

(2)

$B'(3, -1, 2)$

 (S) (Δ)

(3)

$d(O, (\Delta)):$

 (S) $[BB']$

(4)

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:

 M

$$B \quad A \quad MA^2 - MB^2 = 0 \quad (1)$$

$$C \quad B \quad A \quad (\overline{MA} + \overline{MB}) \cdot (\overline{MB} + \overline{MC}) = 0 \quad (2)$$

$$C \quad B \quad A \quad \overline{AM} \cdot (\overline{AB} \wedge \overline{AC}) = 0 \quad (3)$$

$$\overline{MG} \wedge \overline{MA} = \vec{0} \Leftrightarrow 2 \cdot \overline{MC} \wedge \overline{MA} - \overline{MB} \wedge \overline{AB} = \vec{0} \quad (4)$$

 $(B, 1)$ $(C, 2)$ G

$$2 \cdot \overline{MC} \wedge \overline{MA} - \overline{MB} \wedge \overline{AB} = \vec{0} : \quad M \quad ($$

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$$C(3,3,3) \quad B(2,4,2) \quad A(2,0,-1)$$

$$(S): x^2 + y^2 + z^2 - 4x - 4y - 8z + 20 = 0$$

$$.2 \quad \Omega(2,2,4) \quad (S) \quad (1)$$

$$.(BC) \quad A \quad (P) \quad (2)$$

$$.x - y + z - 1 = 0 \quad (P)$$

$$.1 \quad (\Gamma) \quad (S) \quad (P) \quad (3)$$

$$.\Omega \quad (P) \quad (\Delta) \quad (4)$$

$$(2007/2006) \quad (\Gamma) \quad \omega \quad (5)$$

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$$(S): x^2 + y^2 + z^2 - 2x - 2y = 0 \quad (P): x - y - z - 1 = 0$$

$$.(S) \quad R \quad \Omega \quad (1)$$

$$.r \quad \omega \quad (C) \quad (S) \quad (P) \quad (2)$$

$$.O \quad (S) \quad (L) \quad (3)$$

بالتوفيق

$$.(L) \quad (P) \quad (\Delta) \quad (4)$$

$$.(L) \quad (P) \quad (\Delta) \quad (4)$$

$$.(L) \quad (P) \quad (\Delta) \quad (4)$$

$$.(L) \quad (P) \quad (\Delta) \quad (4)$$

$$.(L) \quad (P) \quad (\Delta) \quad (4)$$

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$$.D(1,-1,1) \quad (P): x - z + 1 = 0$$

$$.DH \quad H \quad (P) \quad D \quad H \quad (1)$$

$$.(S): 2x^2 + 2y^2 + 2z^2 - 4x + 4y - 4z + 5 = 0 : \quad (2)$$

$$(P)$$

$$.(S) \quad (\Delta): \begin{cases} y - x + 2 = 0 \\ z = 1 \end{cases} \quad (3)$$

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$$.A(1, 2, -3) \quad \Omega(-3, 2, 0)$$

$$(S) \quad x^2 + y^2 + z^2 + 6x - 4y - 12 = 0 : \quad (1)$$

$$.A \quad \Omega$$

$$(02/01) \quad .A \quad (S) \quad (P) \quad (2)$$

$$.(L) \quad (S) \quad (\Delta) \perp (P) \quad (\Delta): \begin{cases} x = 4t \\ y = -2 \\ z = -3t \end{cases}, t \in \mathbb{R} \quad (3)$$

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(2009/2008)

$$(P): 2x + y + 2z - 13 = 0 \quad A(2,2,-1)$$

$$.3 \quad \Omega(1,0,1)$$

$$.A \in (S) \quad (S): x^2 + y^2 + z^2 - 2x - 2z - 7 = 0 \quad (1)$$

$$.(S) \quad (P) \quad (P) \quad \Omega \quad (2)$$

$$.(P) \quad A \quad (D) \quad (2)$$

$$.\overline{\Omega A} \wedge \vec{u}(6, -6, -3) \quad (D) \quad \vec{u}(2, 1, 2) \quad (3)$$

$$.A \quad (S) \quad (D) \quad \frac{\|\overline{\Omega A} \wedge \vec{u}\|}{\|\vec{u}\|} \quad (4)$$

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$$(\mathcal{P}'): x + y + z = 0 \quad (\mathcal{P}): 2x + y - 2z - 13 = 0$$

$$.(\mathcal{P}') \quad (\mathcal{P}) \quad (\Delta) \quad (1)$$

$$(\mathcal{L}): \begin{cases} y = 0 \\ x^2 + z^2 + 10z + 9 = 0 \end{cases} : \quad (\mathcal{L}) \quad (2)$$

$$.(\mathcal{P}) \quad (\mathcal{L})$$

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(96/97)

$$(S) = \{ M \in \mathcal{L} / \overline{AM} \cdot \overline{BM} = 1 \} \quad B(-1, 1, -1) \quad A(1, -1, 1)$$

$$.2 \quad O \quad (S) \quad (1)$$

$$(S) \quad (P): x + \sqrt{2}y + 3z = 4\sqrt{3} \quad (2)$$

$$.(S) \quad (\Delta) \quad d(O; (\Delta)) \quad (\Delta): \begin{cases} x + y + \sqrt{2}z = 4 \\ x - y = 0 \end{cases} \quad (3)$$

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(95/96)

$$.[AB] \quad (S) \quad B(1, -3, -2) \quad A(5, -1, 2) :$$

$$.r \quad (S) \quad \omega \quad (1)$$

$$.(AB) \quad \omega \quad (P) \quad (2)$$

$$(S) \quad (P) \quad (3)$$

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(2008)

$$(S): x^2 + y^2 + z^2 - 2x - 4z + 2 = 0 \quad B(1, -1, 0) \quad A(0, -1, 1)$$

$$.A \in (S) \quad \sqrt{3} \quad (S) \quad \Omega(1, 0, 2) \quad (1)$$

$$.(OAB) \quad x + y + z = 0 \quad \overline{OA} \wedge \overline{OB} \quad (2)$$

$$.A \quad (S) \quad (OAB) \quad (3)$$

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(2008)

$$(S): x^2 + y^2 + z^2 - 4x - 6y + 2z + 5 = 0 \quad (P): x + 2y + z - 1 = 0$$

$$.d(I, (P)) = \sqrt{6} : 3 \quad (S) \quad I(2, 3, -1) \quad (1)$$

$$.\sqrt{3} \quad (\Gamma) \quad (S) \quad (P) \quad (2)$$

$$.(P) \quad I \quad (D) \quad (3)$$

$$.H(1, 1, -2) \quad (\Gamma) \quad (4)$$

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$$.\vec{u}(-1, 2, 1) \quad B(1, 1, 3) \quad A'(1, -1, 1) \quad (93/94)$$

$$.\frac{\sqrt{2}}{2} \quad \Omega\left(\frac{3}{2}, -1, \frac{3}{2}\right) \quad (S) \quad (1)$$

$$.A \quad (S) \quad T(B; \vec{u}) \quad (2)$$

$$.\vec{u}' = \overline{\Omega A'} \wedge \vec{u} \quad (S) \quad [AA'] \quad (3)$$

$$.A' \quad (S) \quad \vec{u}' \quad A' \quad (T') \quad (4)$$

$$.(S) \quad A' \quad (T) \quad (P) \quad (5)$$

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$$.C(2, 5, -2) \quad B(1, 7, -2) \quad A(1, 3, -4)$$

$$.C \quad B \quad A \quad \overline{AB} \wedge \overline{AC}(4, 2, -4) \quad (1)$$

$$.ABC \quad |\sin(\overline{AB}, \overline{AC})| \quad (2)$$

$$.(ABC) \quad 2x + y - 2z - 13 = 0 : \quad (3)$$