

$$\vec{M} = (x, y, z); \overrightarrow{AM} = r\overrightarrow{MB} \rightarrow \vec{M} - \vec{A} = r(\vec{B} - \vec{M}) \rightarrow \vec{M} = \frac{r\vec{B} + \vec{A}}{r+1} \rightarrow \vec{M} = (1, -1, 1)$$

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$$\vec{a} = \frac{\vec{a} \cdot \vec{b}}{\vec{b} \cdot \vec{b}} \vec{b} = \frac{1-6+0}{1+4+0} (1, 2, 0) = (-1, -2, 0); \vec{a}' = r\vec{a} - \vec{a} = (-2, -4, 0) - (-1, -2, 0) = (-1, -2, 0)$$

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$$\begin{cases} \vec{c} = \vec{a} + \vec{b} = (4, 2, -2) \\ \vec{d} = \vec{a} - \vec{b} = (2, 4, 2) \end{cases} \Rightarrow \cos \alpha = \frac{\vec{c} \cdot \vec{d}}{|\vec{c}| |\vec{d}|} = \frac{8+8-4}{\sqrt{24} \sqrt{24}} = \frac{1}{2} \Rightarrow \alpha = 60^\circ$$

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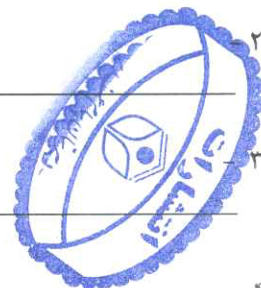
$$\vec{c} = \vec{a} \times \vec{b} = \begin{vmatrix} 1 & -2 & 3 \\ 2 & 1 & -1 \end{vmatrix} = (-1, 7, 5), \vec{V} = \vec{c} \cdot (\vec{a} \times \vec{b}) = 1+49+25=75$$

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5- می‌دانیم که ضرب خارجی دو بردار، بر هر دو بردار و هر ترکیب خطی دو بردار عمود است، بنابراین به ازای هر مقدار m این ضرب داخلی صفر است. (1)

$$A \begin{vmatrix} 1 \\ -1 \in D, B \begin{vmatrix} 0 \\ 1 \end{vmatrix} \in D'; \overrightarrow{AB} = \vec{B} - \vec{A} = (-1, 1, 1), \overrightarrow{AB} \times \vec{u} = \begin{vmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \end{vmatrix} = (2, 2, 0), d = \frac{|\overrightarrow{AB} \times \vec{u}|}{|\vec{u}|} = \sqrt{6}$$

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$$A \begin{vmatrix} 2 \\ -2 \in D, B \begin{vmatrix} 0 \\ -2 \end{vmatrix} \in D'; \overrightarrow{AB} = \vec{B} - \vec{A} = (-3, 2, -2), \vec{u} \times \vec{u}' = \begin{vmatrix} 1 & -1 & 3 \\ 2 & 1 & 2 \end{vmatrix} = (-6, 3, 3), d = \frac{|\overrightarrow{AB} \cdot (\vec{u} \times \vec{u}')|}{|\vec{u} \times \vec{u}'|} = \sqrt{6}$$

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$$A \begin{vmatrix} 1 \\ -1 \in D, B \begin{vmatrix} 0 \\ 2 \end{vmatrix} \in D'; \overrightarrow{AB} = \vec{B} - \vec{A} = (-1, 1, 2), \vec{n} = \vec{u} \times \overrightarrow{AB} = \begin{vmatrix} 2 & 1 & 1 \\ -1 & 1 & 2 \end{vmatrix} = (1, 5, 3), P: x+5y+3z=6 \rightarrow M \begin{vmatrix} 6 \\ 0 \\ 0 \end{vmatrix}$$

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$$\vec{n} = \overrightarrow{AB} = \vec{B} - \vec{A} = (-2, -2, 2), M = \frac{\vec{A} + \vec{B}}{2} = (2, 0, 1), P: -2x-2y+2z=-2 \rightarrow x+y-z=1$$

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$$rR = \frac{|0-4|}{\sqrt{1+1}} \rightarrow R=2; L: x-y+\frac{0+4}{2}=0 \xrightarrow{O(-1,\beta) \in L} -1-\beta+2=0 \rightarrow \beta=1 \rightarrow C: (x+1)^2 + (y-1)^2 = 2$$

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$$O_1 \begin{vmatrix} 1 \\ 0 \end{vmatrix}, R_1 = \frac{1}{2} \sqrt{4+12} = 2; O_2 \begin{vmatrix} 0 \\ -2\sqrt{6} \end{vmatrix}, R_2 = \frac{1}{2} \sqrt{24-4b} = \sqrt{6-b}; O_1 O_2 = 5; 2 + \sqrt{6-b} = 5 \Rightarrow b = -3$$

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$$O \begin{vmatrix} \alpha \\ \alpha \end{vmatrix}, R = OA \Rightarrow \frac{|r\alpha - \alpha|}{\sqrt{4+1}} = \sqrt{(\alpha-6)^2 + (\alpha-2)^2} \rightarrow \alpha = 5 \Rightarrow R = \sqrt{5}$$

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$$r(x^2 - x + \frac{1}{4} - \frac{1}{4}) + y^2 = r \rightarrow \frac{(x-0/5)^2}{1} + \frac{y^2}{4} = 1 \rightarrow \begin{cases} b=1 \\ c=\sqrt{r} \end{cases}; S = \frac{rc \times b}{r} = bc = 1 \times \sqrt{r} = \sqrt{r}$$

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