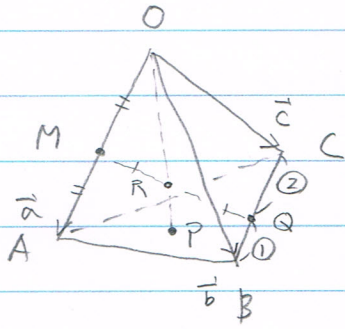


数B327

例14 P61



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$$\begin{aligned} \vec{OR} &= \frac{\vec{OM} + \vec{OQ}}{2} \\ &= \frac{1}{2} (\vec{OM} + \vec{OQ}) \\ &= \frac{1}{2} \left( \frac{1}{2} \vec{a} + \frac{2\vec{b} + \vec{c}}{1+2} \right) \\ &= \frac{1}{4} \vec{a} + \frac{1}{2} \cdot \frac{2\vec{b} + \vec{c}}{3} \\ &= \frac{1}{4} \vec{a} + \frac{2\vec{b} + \vec{c}}{6} \\ &= \frac{1}{4} \vec{a} + \frac{1}{3} \vec{b} + \frac{1}{6} \vec{c} \end{aligned}$$

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$$\begin{aligned} \vec{OP} &= k \vec{OR} \quad (k \text{は実数}) \text{ より} \\ &= k \left( \frac{1}{4} \vec{a} + \frac{1}{3} \vec{b} + \frac{1}{6} \vec{c} \right) \\ \vec{OP} &= \frac{1}{4} k \vec{a} + \frac{1}{3} k \vec{b} + \frac{1}{6} k \vec{c} \quad \dots \text{①} \end{aligned}$$

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また P は平面 ABC 上にあり

$$\begin{aligned} \vec{AP} &= s \vec{AC} + t \vec{AB} \quad (s, t \text{は実数}) \\ \vec{OP} - \vec{OA} &= s (\vec{OC} - \vec{OA}) + t (\vec{OB} - \vec{OA}) \\ \vec{OP} - \vec{a} &= s (\vec{c} - \vec{a}) + t (\vec{b} - \vec{a}) \\ \vec{OP} &= s \vec{c} - s \vec{a} + t \vec{b} - t \vec{a} + \vec{a} \\ &= (-s - t + 1) \vec{a} + t \vec{b} + s \vec{c} \quad \dots \text{②} \end{aligned}$$

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$$\begin{cases} \frac{1}{4} k = -s - t + 1 & \dots \text{③} \\ \frac{1}{3} k = t & \dots \text{④} \\ \frac{1}{6} k = s & \dots \text{⑤} \end{cases}$$

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④, ⑤ を ③ に代入

$$\frac{1}{4} k = -\frac{1}{6} k - \frac{1}{3} k + 1$$

両辺に 12 をかけ

$$\begin{aligned} 3k &= -2k - 4k + 12 \\ 9k &= 12 \end{aligned}$$

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$$\begin{aligned} 9k &= 12 \\ k &= \frac{12}{9} = \frac{4}{3} \\ \text{①より} \\ \vec{OP} &= \frac{1}{4} k \vec{a} + \frac{1}{3} k \vec{b} + \frac{1}{6} k \vec{c} \\ &= \frac{1}{4} \cdot \frac{4}{3} \vec{a} + \frac{1}{3} \cdot \frac{4}{3} \vec{b} + \frac{1}{6} \cdot \frac{4}{3} \vec{c} \\ &= \frac{1}{3} \vec{a} + \frac{4}{9} \vec{b} + \frac{2}{9} \vec{c} \\ \therefore \vec{OP} &= \frac{1}{3} \vec{a} + \frac{4}{9} \vec{b} + \frac{2}{9} \vec{c} \end{aligned}$$