

Btáp 2. Cho hệ vectơ  $u_1 = (2, 1, 3, -1)$   $u_2 = (7, 2, 1, -1)$   
 $u_3 = (1, 1, -3, 0)$   $u_4 = (2, 3, 3, 1)$

Sử dụng phép trừ giao hoán, hãy tìm 1 cơ sở trực chuẩn của kg vectơ con sinh bởi 4 vectơ này.

Giải:

$$w_1 = u_1 = (2, 1, 3, -1)$$

$$w_2 = u_2 - \text{pr}_{w_1}(u_2) = (7, 2, 1, -1) - \frac{\langle u_2, w_1 \rangle}{\langle w_1, w_1 \rangle} \cdot w_1 = (7, 2, 1, -1) - \frac{14 + 2 + 3 + 1}{4 + 1 + 9 + 1} \cdot (2, 1, 3, -1) \\ = (7, 2, 1, -1) - \frac{4}{3} \cdot (2, 1, 3, -1)$$

$$\Rightarrow w_2 = \left( \frac{13}{3}, \frac{2}{3}, -3, \frac{1}{3} \right)$$

KOKUYO

$$\begin{aligned}
 w_3 &= u_3 - \frac{\langle u_3, w_1 \rangle}{\langle w_1, w_1 \rangle} w_1 - \frac{\langle u_3, w_2 \rangle}{\langle w_2, w_2 \rangle} w_2 \\
 &= u_3 - \frac{2+1-9+0}{4+1+9+1} w_1 - \frac{\frac{13}{3} + \frac{2}{3} + 9 + 0}{\frac{13^2}{9} + \frac{4}{9} + 9 + \frac{1}{9}} w_2 \\
 &= (1, 1, -3, 0) + \frac{2}{5} \cdot (2, 1, 3, -1) - \frac{42}{85} \cdot \left( \frac{13}{3}, \frac{2}{3}, -3, \frac{1}{3} \right) \\
 &= \left( -\frac{29}{85}, \frac{91}{85}, -\frac{27}{85}, -\frac{48}{85} \right)
 \end{aligned}$$

$$\begin{aligned}
 w_4 &= u_4 - \frac{\langle u_4, w_1 \rangle}{\langle w_1, w_1 \rangle} w_1 - \frac{\langle u_4, w_2 \rangle}{\langle w_2, w_2 \rangle} w_2 - \frac{\langle u_4, w_3 \rangle}{\langle w_3, w_3 \rangle} w_3 \\
 &= u_4 -
 \end{aligned}$$

$$\text{Đặt } e_1 = \frac{w_1}{\|w_1\|} = \frac{1}{\sqrt{15}} \cdot w_1 = \left( \frac{2}{\sqrt{15}}, \frac{1}{\sqrt{15}}, \frac{3}{\sqrt{15}}, \frac{-1}{\sqrt{15}} \right)$$

$$e_2 = \frac{w_2}{\|w_2\|} = \frac{1 \cdot 3}{\sqrt{255}} \cdot w_2 = \left( \frac{13}{\sqrt{255}}, \frac{2}{\sqrt{255}}, \frac{-9}{\sqrt{255}}, \frac{1}{\sqrt{255}} \right)$$

$$e_3 = \frac{w_3}{\|w_3\|} =$$