Quiz 4 — MATH 1586 Spring 2018

1. Calculate $\langle 1,2,3\rangle + 2\langle 1,-1,5\rangle$.
   Solution: Calculate

$$\begin{aligned}\langle 1,2,3\rangle + 2\langle 1,-1,5\rangle &= \langle 1,2,3\rangle + \langle 2,-2,10\rangle \\ &= \langle 1+2, 2-2, 3+10\rangle \\ &= \langle 3,0,13\rangle.\end{aligned}$$

2. Calculate $\langle 1,2,3\rangle \cdot \langle 1,-1,5\rangle$.
   Solution: Calculate

$$\begin{aligned}\langle 1,2,3\rangle \cdot \langle 1,-1,5\rangle &= 1(1) + 2(-1) + 3(5) \\ &= 1 - 2 + 15 \\ &= 14.\end{aligned}$$

3. Calculate $\langle 1,2,3\rangle \times \langle 1,-1,5\rangle$.
   Solution: Calculate

$$\begin{aligned}\langle 1,2,3\rangle \times \langle 1,-1,5\rangle &= \det \begin{bmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 2 & 3 \\ 1 & -1 & 5 \end{bmatrix} \\ &= \vec{i}\det \begin{bmatrix} 2 & 3 \\ -1 & 5 \end{bmatrix} - \vec{j}\det \begin{bmatrix} 1 & 3 \\ 1 & 5 \end{bmatrix} + \vec{k}\begin{bmatrix} 1 & 2 \\ 1 & -1 \end{bmatrix} \\ &= \vec{i}(10-(-3)) - \vec{j}(5-3) + \vec{k}(-1-2) \\ &= 13\langle 1,0,0\rangle - 2\langle 0,1,0\rangle - 3\langle 0,0,1\rangle \\ &= \langle 13,-2,-3\rangle.\end{aligned}$$