

HW: p.407 #1,3,5,7,9,11,13

13. Prove that $(\vec{a} - \vec{b}) \times (\vec{a} + \vec{b}) = 2\vec{a} \times \vec{b}$ is true.

$$\begin{matrix} a_1 - b_1 & a_2 - b_2 & a_3 - b_3 \\ a_1 + b_1 & a_2 + b_2 & a_3 + b_3 \end{matrix} \quad \begin{matrix} a_1 - b_1 & a_2 - b_2 & a_3 - b_3 \\ a_1 + b_1 & a_2 + b_2 & a_3 + b_3 \end{matrix}$$

LS $\left[(a_2 - b_2)(a_3 + b_3) - (a_3 - b_3)(a_2 + b_2), (a_3 - b_3)(a_1 + b_1) - (a_1 - b_1)(a_3 + b_3), (a_1 - b_1)(a_2 + b_2) - (a_2 - b_2)(a_1 + b_1) \right]$

(1st) $a_2 a_3 + a_2 b_3 - b_2 a_3 - b_2 b_3 - (a_2 a_3 + b_2 a_3 - a_2 b_3 - b_2 b_3)$
 $a_2 a_3 + a_2 b_3 - b_2 a_3 - b_2 b_3 - a_2 a_3 - b_2 a_3 + a_2 b_3 + b_2 b_3$

$2(a_2 b_3 - b_2 a_3)$

(2nd) $a_3 a_1 + b_3 a_1 - a_3 b_1 - b_3 b_1 - (a_3 a_1 + a_3 b_1 - a_3 b_1 - b_3 b_1)$

$2(b_1 a_3 - a_1 b_3)$

(3rd) $a_1 a_2 + a_1 b_2 - b_1 a_2 - b_1 b_2 - (a_1 a_2 + b_1 a_2 - a_1 b_2 - b_1 b_2)$

$2(a_1 b_2 - b_1 a_2)$

RS $\vec{a} \quad \begin{matrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{matrix} \quad \begin{matrix} a_1 a_2 a_3 \\ b_1 b_2 b_3 \end{matrix}$

$(a_2 b_3 - b_2 a_3, b_1 a_3 - a_1 b_3, a_1 b_2 - b_1 a_2)$

$2\vec{a} \times \vec{b} = 2 \left(\begin{matrix} a_2 b_3 - b_2 a_3 \\ b_1 a_3 - a_1 b_3 \\ a_1 b_2 - b_1 a_2 \end{matrix} \right)$

$\therefore LS = RS$