1.2.12

$(p - \lambda q)(p - \lambda q) \geq 0$ Apply Square

$|p|^2 - 2\lambda pq + \lambda^2 |q|^2 \geq 0$ Apply λ value $\frac{p \cdot q}{|q|^2}$

$|p|^2 - 2\frac{p \cdot q}{|q|^2} \cdot pq + \left(\frac{p \cdot q}{|q|^2}\right)^2 \cdot |q|^2 \geq 0$

$|p|^2 - 2\frac{(p \cdot q)^2}{|q|^2} + \frac{(p \cdot q)^2}{|q|^2} \geq 0$

$|p|^2 - \frac{(p \cdot q)^2}{|q|^2} \geq 0$

$|p|^2 \cdot |q|^2 \geq 0$

$|p| \cdot |q| \geq p \cdot q$

Since the dot Product Grater than zero
They are in same direction and not aligned