

$$\begin{aligned}
 \textcircled{3} \quad \langle u, v+w \rangle &= \langle u, v \rangle + \langle u, w \rangle \\
 \langle u, v+w \rangle &= \langle (3, -2), (4, 5) + (-1, 6) \rangle \\
 &= \langle (3, -2), (4-1, 5+6) \rangle \\
 &= \langle (3, -2), (3, 11) \rangle \\
 &= (3)(3) + (-2)(11) \\
 &= 9 - 22 \\
 &= -13
 \end{aligned}$$

$$\begin{aligned}
 \langle u, v \rangle + \langle u, w \rangle &= \langle (3, -2), (4, 5) \rangle + \langle (3, -2), (-1, 6) \rangle \\
 &= (3)(4) + (-2)(5) + (3)(-1) + (-2)(6) \\
 &= (12 - 10) + (-3 - 12) \\
 &= 2 + (-15) \\
 &= -13.
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{4} \quad \langle ku, v \rangle &= k \langle u, v \rangle = \langle u, kv \rangle \\
 \langle ku, v \rangle &= \langle (-4)(3, -2), (4, 5) \rangle \\
 &= \langle (-12, 8), (4, 5) \rangle \\
 &= (-12)(4) + (8)(5) \\
 &= -48 + 40 \\
 &= -8
 \end{aligned}$$

$$\begin{aligned}
 k \langle u, v \rangle &= -4 \langle (3, -2), (4, 5) \rangle \\
 &= (-4) ((3)(4) + (-2)(5)) \\
 &= (-4) (12 - 10) \\
 &= -4 (2) \\
 &= -8
 \end{aligned}$$