$$\langle u, kv \rangle = \langle (3,-2), (-4)(4,5) \rangle$$
$$= (3,-2), (-16,-20)$$
$$= (3)(-16) + (-2)(-20)$$
$$= -48 + 40$$
$$= -8.$$

(e) $\langle 0, v \rangle = \langle v, 0 \rangle = 0$

$\langle 0, v \rangle = \langle 0, (4,5) \rangle = (0)(4) + (0)(5) = 0+0 = 0$

$\langle v, 0 \rangle = \langle (4,5), 0 \rangle = (4)(0) + (5)(0) = 0+0 = 0$

Ex 2 Weighted inner product $\langle u, v \rangle = 4u_1v_1 + 5u_2v_2$

$$\langle u, v \rangle = 4u_1v_1 + 5u_2v_2$$

(a) $\langle u, v \rangle = \langle v, u \rangle$

$k = -4$ $\quad u = (3,-2)$, $v = (4,5)$, $w = (-1,6)$

$$\langle u, v \rangle = 4(3)(4) + 5(-2)(5)$$
$$= 4(12) + 5(-10)$$
$$= 48 - 50$$
$$= -2$$

$$\langle v, u \rangle = 4v_1u_1 + 5v_2u_2$$
$$= 4(4)(3) + 5(5)(-2)$$
$$= 4(12) + 5(-10)$$
$$= 48 - 50$$
$$= -2$$