Assignment# 4.1

(2) $v = (4, 7, -3, 2)$ & $w = (5, -2, 8, 1)$

$5x - 2v = 2(w - 5x)$

Let $x = (x_1, x_2, x_3, x_4)$

$\therefore 5x - 2v = 2w - 10x$

$\therefore 15x = 2w + 2v$

$\therefore x = \frac{1}{15}(2w + 2v)$

$= \frac{1}{15}[(10, -4, 16, 2) + (8, 14, -6, 4)]$

$= \frac{1}{15}(18, 10, 10, 6)$

$\boxed{(x_1, x_2, x_3, x_4) = (6/5, 2/3, 2/3, 2/5) = x}$

(8) $v = (-2, 3, 0, 6)$. All scalars k such that $\|kv\| = 5$

$\|kv\| = \sqrt{(-2k)^2 + (3k)^2 + (0 \cdot k)^2 + (6k)^2}$

$= \sqrt{4k^2 + 9k^2 + 36k^2}$

$= \pm k\sqrt{49}$

$\|kv\| = \pm 7k$

But $\|kv\| = 5$

$\therefore \pm 7k = 5$

$\therefore \boxed{k = \pm \frac{5}{7}}$

(9b) Find Euclidean ~~Product~~ inner product $u \cdot v$

$u = (2, 8, 2)$, $v = (0, 1, 3)$

$u \cdot v = u_1 v_1 + u_2 v_2 + \cdots + u_n v_n$

$\therefore u \cdot v = (2, 8, 2) \cdot (0, 1, 3)$

$= (2 \cdot 0) + (8 \cdot 1) + (2 \cdot 3)$

$= 0 + 8 + 6$

$= 14.$

$\therefore \boxed{u \cdot v = 14}$

(15a) For which values of k are u & v orthogonal?

$u = (2, 1, 3)$ & $v = (1, 7, k)$

If u & v are orthogonal then

$u \cdot v = 0.$

$\therefore (2, 1, 3) \cdot (1, 7, k) = 0$

$\therefore (2 \cdot 1) + (1 \cdot 7) + (3 \cdot k) = 0$

$\therefore 2 + 7 + 3k = 0$

$\therefore 3k = -9 \Rightarrow k = -9/3$

$\therefore \boxed{k = -3}$