13- $u = (4, -1)$, $v = (0, 5)$ e $w = (-3, -3)$

a) $u + w = (4, -1) + (-3, -3) = (1, -4)$

b) $v - 3u = (0, 5) - 3(4, -1) = (0, 5) - (12, -3) = (-12, 8)$

c) $2(u - 5w) = 2((4, -1) - 5(-3, -3)) = 2((4, -1) - (-15, -15)) =$

$= 2(19, 14) = (38, 28)$

d) $3v - 2(u + 2w) = 3(0, 5) - 2((4, -1) + 2(-3, -3)) = (0, 15) - 2((4, -1) + (-6,$

$= (0, 15) - 2(-2, -7) = (0, 15) - (-4, -14) = (4, 29)$

e) $-3(w - 2u + v) = -3((-3, -3) - 2(4, -1) + (0, 5)) = -3((-3, -3) - (8, -2) + (0, 5))$

$= -3(-11, 4) = (33, -12)$

f) $(-2u - v) - 5(v + 3w) = (-2(4, -1) - (0, 5)) - 5((0, 5) + 3(-3, -3)) =$

$= ((-8, 2) - (0, 5)) - 5((0, 5) + (-9, -9)) = (-8, -3) - 5(-9, -4) = (-8, -3) - (-45,$

$= (37, 17)$

15 - $u = (-3, 2, 1, 0)$, $v = (4, 7, -3, 2)$ e $w = (5, -2, 8, 1)$

a) $v - w = (4, 7, -3, 2) - (5, -2, 8, 1) = (-1, 9, -11, 1)$

b) $2u + 7v = 2(-3, 2, 1, 0) + 7(4, 7, -3, 2) = (-6, 4, 2, 0) + (28, 49, -21, 14)$
$= (22, 53, -19, 14)$

c) $-u + (v - 4w) = -(-3, 2, 1, 0) + ((4, 7, -3, 2) - 4(5, -2, 8, 1)) =$
$= (3, -2, -1, 0) + ((4, 7, -3, 2) - (20, -8, 32, 4)) = (3, -2, -1, 0) + (-16, 15, -35, -2$
$= (-13, 13, -36, -2)$

d) $6(u - 3v) = 6((-3, 2, 1, 0) - 3(4, 7, -3, 2)) = 6((-3, 2, 1, 0) - (12, 21, -9, 6$
$= 6(-15, 19, 10, -6) = (-90, 114, 60, -36)$

e) $-v - w = -(4, 7, -3, 2) - (5, -2, 8, 1) = (-4, -7, 3, -2) - (5, -2, 8, 1)$
$= (-9, -5, -5, -3)$

f) $(6v - w) - (4u + v) = (6(4, 7, -3, 2) - (5, -2, 8, 1)) - (4(-3, 2, 1, 0) + (4, 7, -3, 2$
$= ((24, 42, -18, 12) - (5, -2, 8, 1)) - ((-12, 8, 4, 0) + (4, 7, -3, 2)) =$
$= (19, 44, -26, 11) - (-8, 15, 1, 2) = (28, 29, -27, 9)$

1° - $u = (5, -1, 0, 3, -3)$, $v = (-1, -1, 7, 2, 0)$ e $w = (-4, 2, -3, -5, 2)$

a) $w - u = (-4, 2, -3, -5, 2) - (5, -1, 0, 3, -3) = (-9, 3, -3, -8, 5)$//

b) $2v + 3u = 2(-1, -1, 7, 2, 0) + 3(5, -1, 0, 3, -3) =$
$= (-2, -2, 14, 4, 0) + (15, -3, 0, 9, -9) = (13, -5, 14, 13, -9)$//

c) $-w + 3(v - u) = -(-4, 2, -3, -5, 2) + 3((-1, -1, 7, 2, 0) - (5, -1, 0, 3, -3)) =$
$= (4, -2, 3, 5, -2) + 3(-6, 0, 7, -1, 3) = (4, -2, 3, 5, -2) + (-18, 0, 21, -3, 9)$
$= (-14, -2, 24, 2, 7)$//

d) $5(-v + 4u - w) = 5(-(-1, -1, 7, 2, 0) + 4(5, -1, 0, 3, -3) - (-4, 2, -3, -5, 2)) =$
$= 5((1, 1, -7, -2, 0) + (20, -4, 0, 12, -12) - (-4, 2, -3, -5, 2)) = 5(25, -5, -4, 15, -14)$
$= (125, -25, -20, 75, -70)$//

e) $-2(3w + v) + (2u + w) =$
$-2(3(-4, 2, -3, -5, 2) + (-1, -1, 7, 2, 0)) + (2(5, -1, 0, 3, -3) + (-4, 2, -3, -5, 2)) =$
$= -2((-12, 6, -9, -15, 6) + (-1, -1, 7, 2, 0)) + ((10, -2, 0, 6, -6) + (-4, 2, -3, -5, 2)) =$
$= -2(-13, 5, -2, -13, 6) + (6, 0, -3, 1, -4) = $
$= (26, -10, 4, 26, -12) + (6, 0, -3, 1, -4) = (32, -10, 5, 27, -16)$//

f) $\frac{1}{2}(w - 5v + 2u) + v =$
$= \frac{1}{2}((-4, 2, -3, -5, 2) - 5(-1, -1, 7, 2, 0) + 2(5, -1, 0, 3, -3)) + (-1, -1, 7, 2, 0) =$
$= \frac{1}{2}((-4, 2, -3, -5, 2) - (-5, -5, 35, 10, 0) + (10, -2, 0, 6, -6)) + (-1, -1, 7, 2, 0) =$
$= \frac{1}{2}(11, 5, -38, -9, -4) + (-1, -1, 7, 2, 0) = (5.5, 2.5, -19, -4.5, -2)$
$+ (-1, -1, 7, 2, 0) = (4.5, 1.5, -12, -2.5, -2)$//

19 - $u=(-3,1,2,4,4)$, $v=(4,0,-8,1,2)$ e $w=(6,-1,-4,3,-5)$

a) $v-w = (4,0,-8,1,2)-(6,-1,-4,3,-5) = (-2,1,-4,-2,7)$ //

b) $6u+2v = 6(-3,1,2,4,4) + 2(4,0,-8,1,2) = (-18,6,12,24,24)+(8,0,-16,2,...$

$= (-10,6,-4,26,28)$ //

c) $(2u-7w)-(8v+u) =$

$= (2(-3,1,2,4,4)-7(6,-1,-4,3,-5))-(8(4,0,-8,1,2)+(-3,1,2,5,5)) =$

$= ((-6,2,4,8,8)-(42,-7,-28,21,-35))-((32,0,-64,8,16)+(-3,1,2,4,4)) =$

$= (-48,9,32,-13,43)-(29,1,-62,12,20) = (-77,8,94,-25,23)$ //