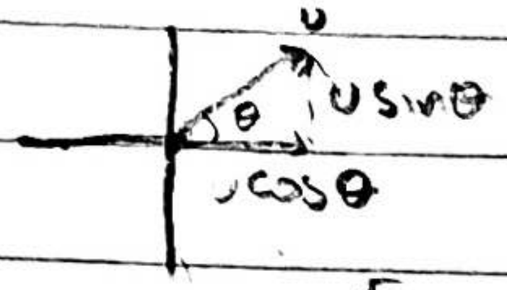
Calc 251 HW : 12.1

5. 

$\theta = 45°$

Components:

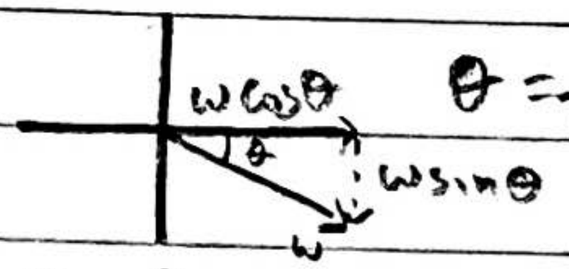
$x = \frac{\sqrt{2}}{2}\|v\|$

$y = \frac{\sqrt{2}}{2}\|v\|$

$\cos(45) = \frac{\sqrt{2}}{2}$

$\sin(45) = \frac{\sqrt{2}}{2}$

$$\boxed{\left\langle \frac{\sqrt{2}}{2}\|v\|, \frac{\sqrt{2}}{2}\|v\| \right\rangle}$$

7. 

$\theta = -20°$

$-20° = 340°$

Components:

$x = \cos(340)\|w\|$

$y = \sin(340)\|w\|$

$\langle \cos(340)\|w\|, \sin(340)\|w\| \rangle$

9. Comp of $\overrightarrow{PQ}$: $P = (3, 2)$ $Q = (2, 7)$

$x = 2 - 3 = -1$

$y = 7 - 2 = 5$

$$\boxed{\overrightarrow{PQ} = \langle -1, 5 \rangle}$$

11. Comp of $\overrightarrow{PQ}$: $P = (3, 5)$ $Q = (1, -4)$

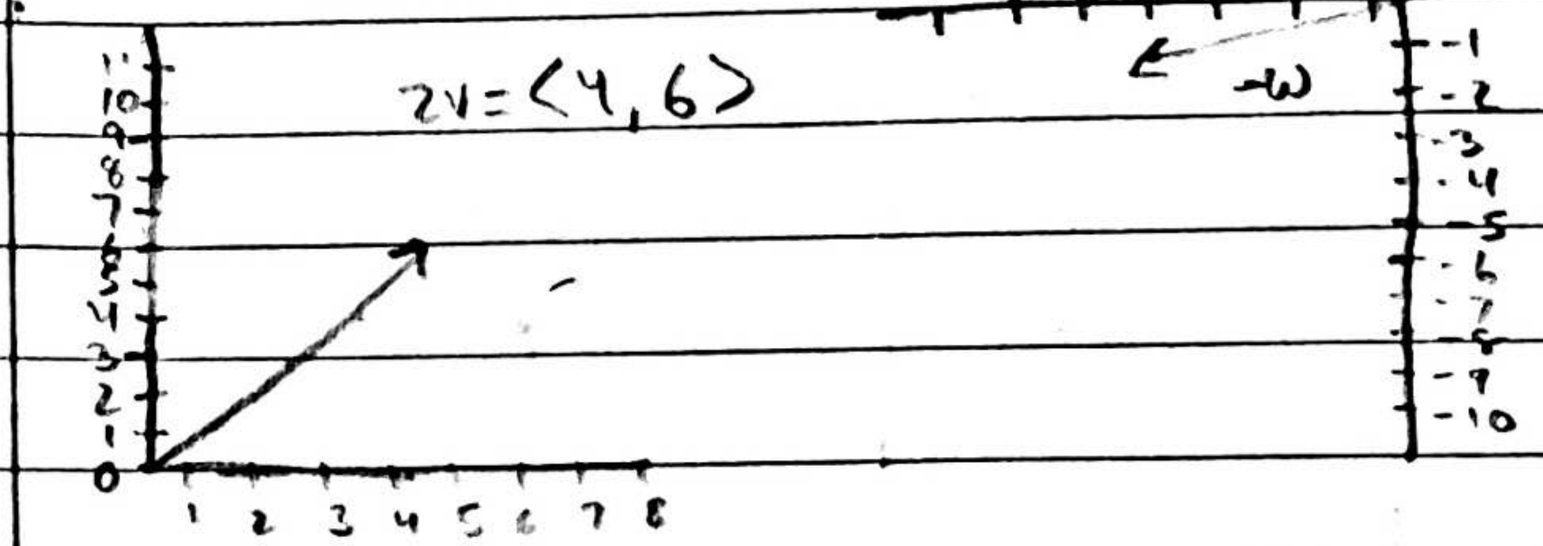
$x = 1 - 3 = -2$

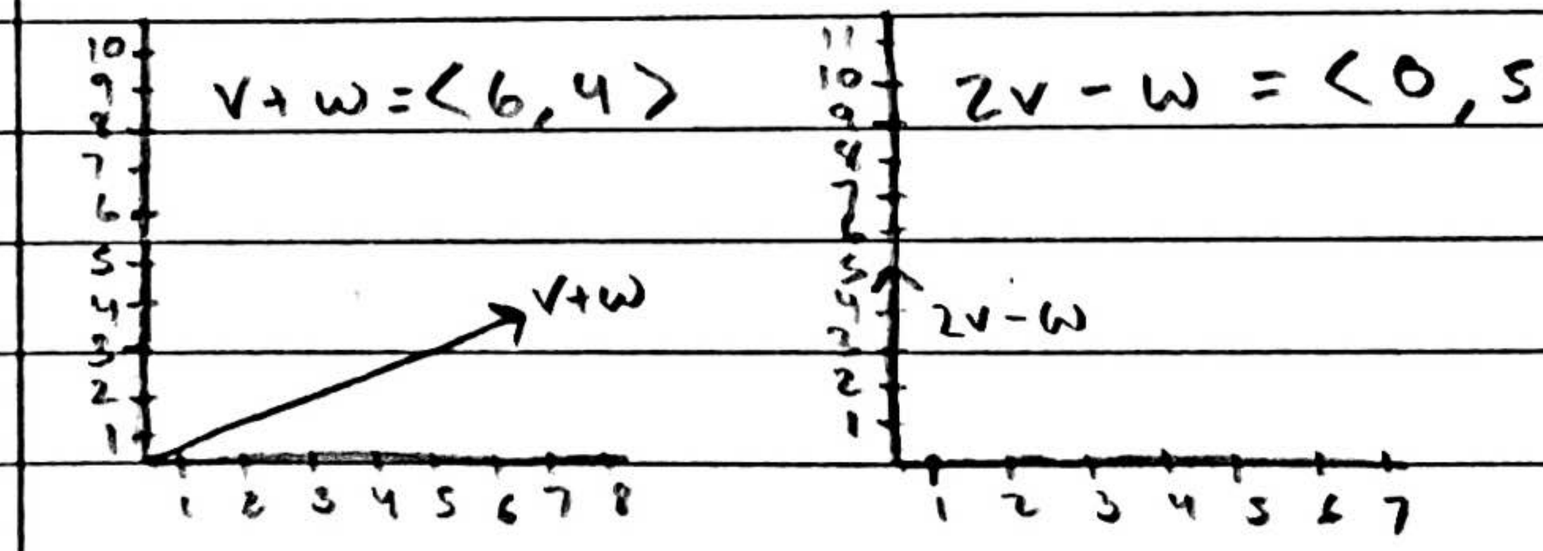
$y = -4 - 5 = -9$

$$\boxed{\overrightarrow{PQ} = \langle -2, -9 \rangle}$$

15. $\boxed{5\langle 6,2\rangle = \langle 30,10\rangle}$

21.





41. $\|v\| = \sqrt{x^2+y^2} = \sqrt{3^2+4^2} = \sqrt{25} = 5$

$e_v = \frac{v}{\|v\|}$

$\boxed{e_v = \left\langle \frac{3}{5}, \frac{4}{5} \right\rangle}$

47. $x = \cos\left(\frac{4\pi}{7}\right)$ $\quad e = \left\langle \cos\left(\frac{4\pi}{7}\right), \sin\left(\frac{4\pi}{7}\right) \right\rangle$

$y = \sin\left(\frac{4\pi}{7}\right)$

Calc 251 HW: 12.2

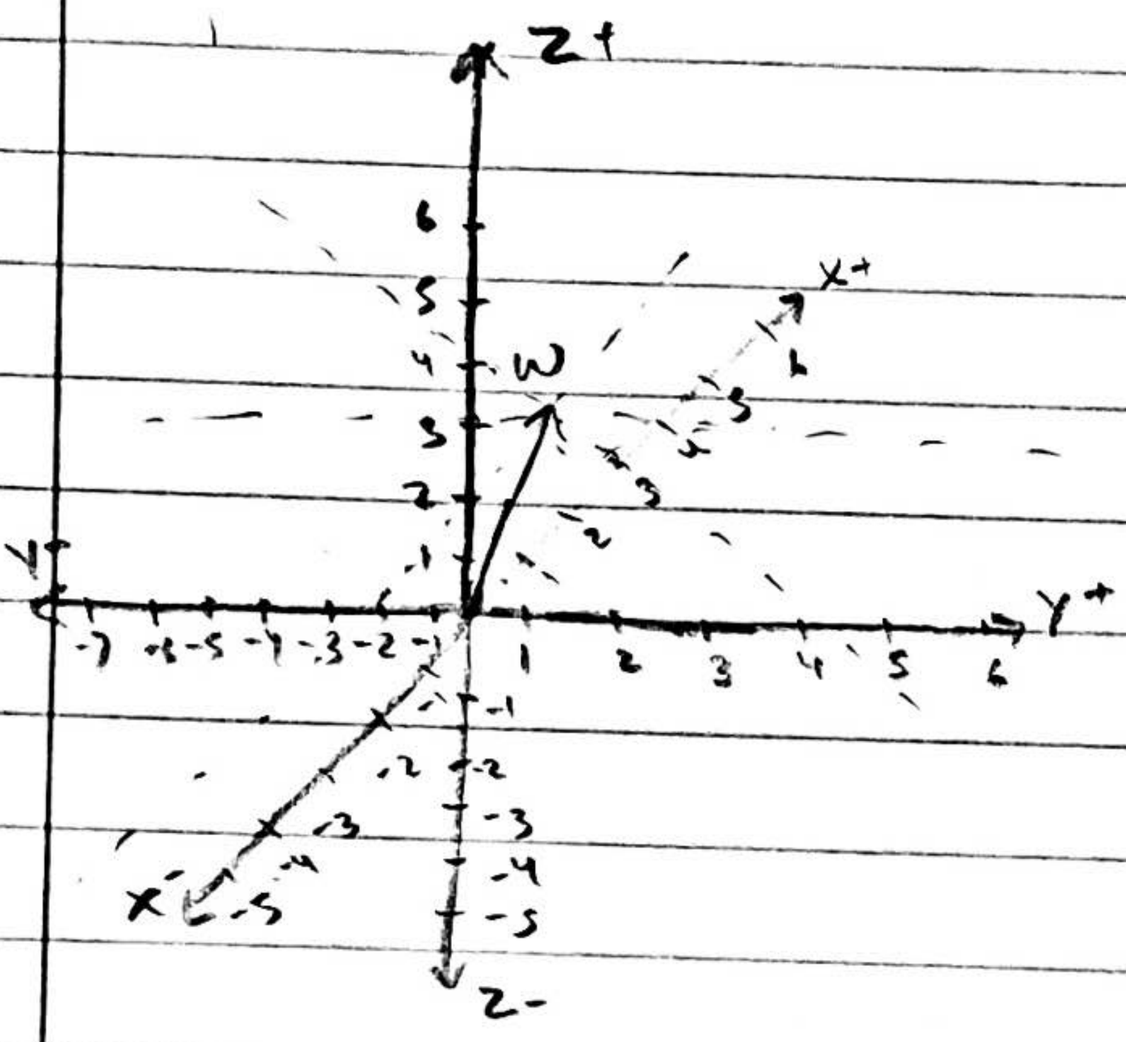
11. $R = (1,4,3)$ $\cdot P = (x,y,z)$

$(1,4,3) - (x,y,z) = \langle 3, -2, 3 \rangle$

$1 - x = 3 \quad x = -2$

$4 - y = -2 \quad y = 6 \quad P = (-2, 6, 0)$

$3 - z = 3 \quad z = 0$



13. (a) is parallel and is in same dir. (c) is parallel and opposite dir.

19. $-2\langle 8, 11, 3 \rangle + 4\langle 2, 1, 1 \rangle$

$= \langle -16, -22, -6 \rangle + \langle 8, 4, 4 \rangle$

$= \boxed{\langle -8, -18, -2 \rangle}$

25 $v = \langle 4, 2, -6 \rangle$, $v = \langle 2, -1, 3 \rangle$

$\boxed{\text{NOT PARALLEL}}$ $\quad \frac{4}{2} \neq \frac{2}{-1} = \frac{-6}{3}$

The vectors are not scalar multiples of each other

27. $u = \langle -3, 1, 4 \rangle$, $v = \langle 6, -2, 8 \rangle$

NOT PARALLEL $\quad -\frac{3}{6} = \frac{1}{-2} \neq \frac{4}{8}$

The vectors are not scalar multiples of each other

31. $v = \langle -4, 4, 2 \rangle$

$\|v\| = \sqrt{x^2 + y^2 + z^2} = \sqrt{(-4)^2 + 4^2 + 2^2}$

$\|v\| = \sqrt{36} = 6$

$e_v = \langle -\frac{4}{6}, \frac{4}{6}, \frac{2}{6} \rangle$

$\boxed{e_v = \langle -\frac{2}{3}, \frac{2}{3}, \frac{1}{3} \rangle}$

49. Vector Parametrization: $r(t) = r_0 + tv$

$P = (x_0, y_0, z_0) = (5, 5, 2)$

$v = \langle a, b, c \rangle = \langle 0, -2, 1 \rangle$

$r_0 = \langle x_0, y_0, z_0 \rangle = \langle 5, 5, 2 \rangle$

$r_1(t) = \langle 5, 5, 2 \rangle + t \langle 0, -2, 1 \rangle$

$r_1(t) = \langle 5, 5, 2 \rangle + \langle 0, -2t, t \rangle$

$\boxed{r_1(t) = \langle 5, 5 - 2t, 2 + t \rangle}$

Multiply v by a scalar multiple λ.

$\lambda = 3$

$r_2(t) = \langle 5, 5, 2 \rangle + 3t \langle 0, -2, 1 \rangle$

$r_2(t) = \langle 5, 5, 2 \rangle + \langle 0, -6t, 3t \rangle$

$\boxed{r_2(t) = \langle 5, 5 - 6t, 2 - 3t \rangle}$

51 Set it in $r_2(t)$ to s for $r(t) = r(s)$

$r_1(t) = \langle -1, 2, 2 \rangle + t\langle 4, -2, 1 \rangle$

$r_2(s) = \langle 0, 1, 1 \rangle + s\langle 2, 0, 1 \rangle$

$r_1(t) = \langle -1 + 4t, 2 - 2t, 2 + t \rangle$

$r_2(s) = \langle 2s, 1, 1 + s \rangle$

$r_1(t) = r_2(s)$

$\langle -1 + 4t, 2 - 2t, 2 + t \rangle = \langle 2s, 1, 1 + s \rangle$

$\langle \underbrace{-1 + 4t = 2s}, \underbrace{2 - 2t = 1}, 2 + t = 1 + s \rangle$

$-1 + 4(\frac{1}{2}) = 2s$ $\quad$ $\boxed{t = \frac{1}{2}}$ $\quad$ $2 + \frac{1}{2} = 1 + \frac{1}{2}$

$-1 + 2 = 2s$ $\quad$ $\boxed{\frac{5}{2} \neq \frac{3}{2}}$

$\boxed{1s. = \frac{1}{2}}$

$r_1(t)$ and $r_2(s)$ don't intersect, because for $t = \frac{1}{2}$ and $s = \frac{1}{2}$ $r_1(t)$ and $r_2(s)$ don't have the same z-coordinate. Thus, these lines do not meet.