12.1 HOMEWORK

5) component of u

$u_x = u \cos(45)$
$\qquad = \dfrac{1}{\sqrt{2}} u$

$u_y = u \sin 45 = \dfrac{1}{\sqrt{2}} u$

7) component of w

$w_x = w \cos 20$

$w_y = -w \sin 20$

9) $\overrightarrow{PQ}$

$(2,7) - (3,2)$

$(-1, 5)$

11) $(1, -4) - (3, 5)$

$(-2, -9)$

15) $5\langle 6, 2 \rangle$

$\langle 30, 10 \rangle$

21) Sketch:-
   $2v$, $-w$, $v+w$
   $2v-3$

$v = \langle 2, 3 \rangle$ $\qquad$ $w = \langle 4, 1 \rangle$

(i) $2\langle 2, 3 \rangle$

$\langle 4, 6 \rangle$

(ii) $-w$
   $= \langle -4, -1 \rangle$
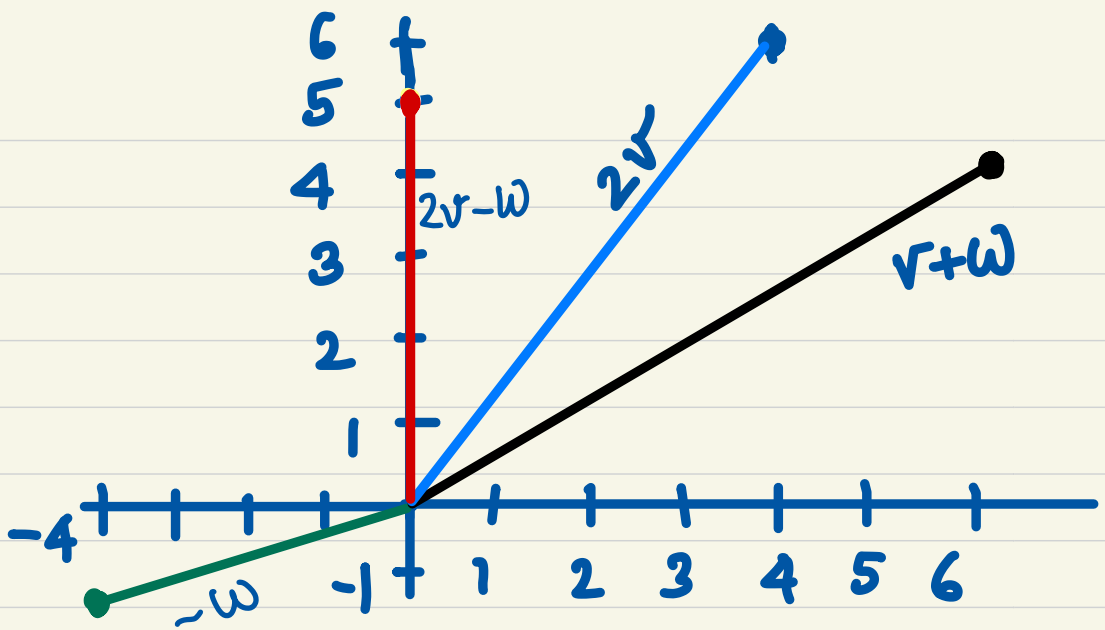
(iii) $\langle 2, 3 \rangle + \langle 4, 1 \rangle$
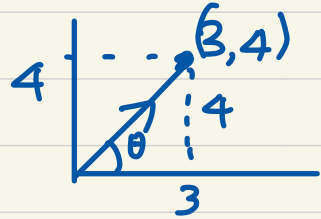
$= \langle 6, 4 \rangle$

(iv) $2v - w$
   $= \langle 4, 6 \rangle - \langle 4, 1 \rangle$
   $= \langle 0, 5 \rangle$

Graph labels: 6, 5, 4, 3, 2, 1 on vertical axis; −4, −1, 1, 2, 3, 4, 5, 6 on horizontal axis. Curves labeled $2v-w$, $2v$, $v+w$, $-w$.

41) unit vector of $v = \langle 3, 4 \rangle$

$$\sqrt{3^2 + 4^2} =$$
$$= \sqrt{25}$$
$$= 5$$

Triangle diagram: vertical side 4, point $(3,4)$, side 4, angle θ, base 3.

$$= \frac{3}{5} i + \frac{4}{5} j$$

47) $\sqrt{(e\cos\theta)^2 + (e\sin\theta)^2} = 1$

$$\left(\cos\frac{4\pi}{7} \;,\; \sin\frac{4\pi}{7}\right)$$

12.2 HOMEWORK

11) $R = \langle 1, 4, 3 \rangle$
    $P = ?$

$\overrightarrow{PR} = \langle 3, -2, 3 \rangle$

$R - P = \langle 3, -2, 3 \rangle$

$\langle 1, 4, 3 \rangle - \langle x, y, z \rangle$

$\left. \begin{array}{l} 1 - x = 3 \\[8pt] 4 - y = -2 \\[8pt] 3 - z = 3 \end{array} \right\} \quad P = \langle -2, 6, 0 \rangle$

13) $v = \langle 4, 8, 12 \rangle$

(a) $\langle 2, 4, 6 \rangle$ *parallel*
same direction

$\langle -1, -2, 3 \rangle$ not parallel

(c) $\langle -7, -14, -21 \rangle$ parallel & opp
                            direction

(d) $\langle 6, 10, 14 \rangle$ not //

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

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

      $\langle -8, -18, -2 \rangle$

25) $u = \langle 4, 2, -6 \rangle$

     $v = \langle 2, -1, 3 \rangle$

     $u \times v$

     $\begin{vmatrix} i & j & k \\ 4 & 2 & -6 \\ 2 & -1 & 3 \end{vmatrix}$

$(6 \bar{0} 6)\ i\ -\ (12+12)\ j\ +\ (-4-4)k$

$0i\ -\ 24j\ -\ 8k$

not parallel

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

$$\begin{vmatrix} i & j & k \\ -3 & 1 & 4 \\ 6 & -2 & 8 \end{vmatrix}$$

$(8+8)\ i\ -\ (^-24+24)\ j\ +\ (6-6)\ k$

$16i$

not parallel

31) $\nu = \langle -4, 4, 2 \rangle$

$|\nu| = \sqrt{16 + 16 + 4}$

$\quad = 6$

$$\left\langle -\frac{\cancel{4}^2}{\cancel{6}3}, \frac{\cancel{4}^2}{\cancel{6}3}, \frac{\cancel{2}^1}{\cancel{6}3} \right\rangle$$

$\cancel{opp} \quad = \left\langle \frac{2}{3}, -\frac{2}{3}, -\frac{1}{3} \right\rangle$

49)

51) $\mathcal{r}_1(t) = \langle -1, 2, 2 \rangle + t \langle 4, -2, 1 \rangle$

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

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

$2t = -1 + 4t \qquad\qquad 2 - 2t = 1$

$2t = 1 \qquad\qquad\qquad 2t = 1$

$t = 1/2 \qquad\qquad\qquad t = 1/2$

$$1 + \cancel{t} = 2 + \cancel{t}$$

$\therefore$ They donot intersect