12.1

5) $\vec{u} = \|\vec{u}\| \cdot \langle \cos(45), \sin(45) \rangle$

7) $\vec{w} = \|\vec{w}\| \cdot \langle \cos(20), -\sin(20) \rangle$

9) $P = (3,2)$, $Q = (2,7)$; $\overrightarrow{PQ} = \langle -1, 5 \rangle$

11) $P = (1,-7)$, $Q = (0,17)$; $\overrightarrow{PQ} = \langle -1, 24 \rangle$

15) $5\langle 6,2 \rangle = \langle 30,10 \rangle$

21) $\vec{v} = \langle 2,3 \rangle$

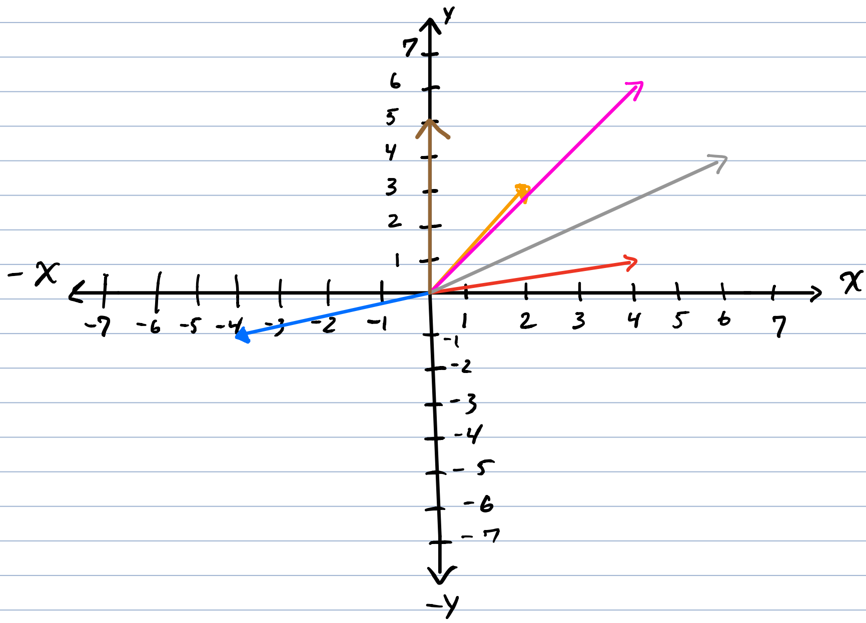
$\vec{w} = \langle 4,1 \rangle$

$\vec{A} = 2\vec{v} = 2\langle 2,3 \rangle = \langle 4,6 \rangle$

$\vec{B} = -\vec{w} = -\langle 4,1 \rangle = \langle -4,-1 \rangle$

$\vec{C} = \vec{v} + \vec{w} = \langle 2,3 \rangle + \langle 4,1 \rangle = \langle 6,4 \rangle$

$\vec{D} = 2\vec{v} - \vec{w} = 2\langle 2,3 \rangle - \langle 4,1 \rangle = \langle 4,6 \rangle - \langle 4,1 \rangle = \langle 0,5 \rangle$



41) Unit vector e_v where $\vec{v} = \langle 3,4 \rangle$

$$\vec{e}_v = \frac{\vec{v}}{\|\vec{v}\|} = \left\langle \frac{3}{\sqrt{3^2+4^2}}, \frac{4}{\sqrt{3^2+4^2}} \right\rangle = \left\langle \frac{3}{5}, \frac{4}{5} \right\rangle$$

47) Unit vector $\vec{e}$ making an angle of $4\pi/7$ with x-axis

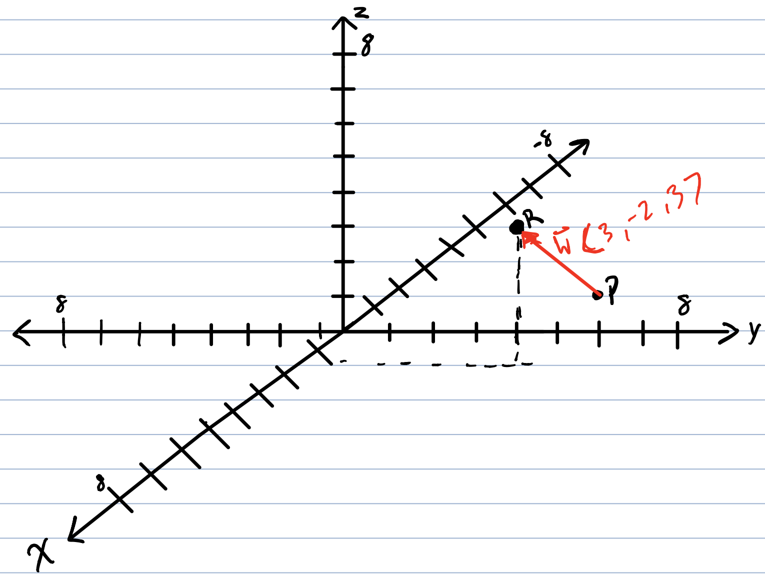
$\vec{e} = \langle \cos(4\pi/7), \sin(4\pi/7) \rangle$?

?

12.2(11,13,19,25,27,31,49,51)

11) Find the point P such that $\vec{w} = \overrightarrow{PR}$ has components $\langle 3,-2,3\rangle$ and sketch $\vec{w}$

$P = ?$
$R = (1,4,3)$
$\vec{w} = \overrightarrow{PR} = \langle 3,-2,3\rangle$
$\vec{R} - \vec{P} = \vec{w}$
$\vec{R} - \vec{w} = \vec{P}$
$\langle 1,4,3\rangle - \langle 3,-2,3\rangle = \vec{P}$
$\langle 1,4,3\rangle + \langle -3,2,-3\rangle = \vec{P}$
$\langle -2,6,0\rangle = \vec{P}$



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

a) $\langle 2,4,6\rangle$ parallel because has a scalar multiple $\lambda = 2$

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) $\vec{u} = \langle 4,2,-6\rangle$, $\vec{v} = \langle 2,-1,3\rangle$
NOT parallel

27) $\vec{u} = \langle -3,1,4\rangle$ $\vec{v} = \langle 6,-2,8\rangle$
NOT parallel

31) Unit vector in the direction opposite to $\vec{v}$ - $\langle -4,4,2\rangle$

$$e_{v_{opp}} = \frac{-1}{\|\vec{v}\|} \cdot \vec{v} = -\left\langle \frac{-4}{6}, \frac{4}{6}, \frac{2}{6} \right\rangle$$

?
49) Find two different vector parametrizations of the line through $P = (-3,1,0)$ with direction vector $\vec{v} = \langle 0,-2,1\rangle$

$r_1(t) = \overrightarrow{OP} + t\vec{v}$
$= \langle -3,1,0\rangle + t\langle 0,-2,1\rangle$
$= \langle -3,1,0\rangle + \langle 0,-2t,t\rangle$
$= \langle -3,1-2t,t\rangle$

$r_2(s) = \overrightarrow{OP} + 2s\vec{v}$
$= \langle -3,1,0\rangle + 2s\langle 0,-2,1\rangle$
$= \langle -3,1,0\rangle + \langle 0,-4s,2s\rangle$
$= \langle -3,1-4s,2s\rangle$

51) Show that $r_1(t)$ and $r_2(s)$ don't intersect

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

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

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

x comp: $4t-1 = 2s \Rightarrow s = \frac{4t-1}{2} = 0$
y comp: $2-2t = 1 \Rightarrow t = 1/2$
z comp: $t+2 = s+1 \Rightarrow s = t+2-1 = 3/2$

Because the system of equations has no solution, $r_1(t)$ and $r_2(s)$ do not intersect