5 7 9 11 15
21 41 47

12.1 HW

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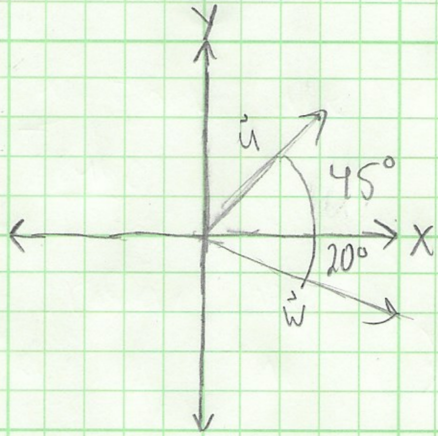
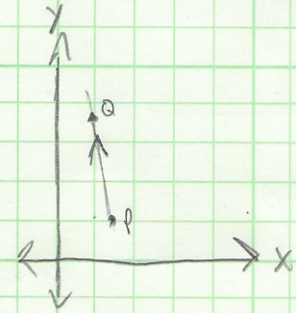


5) $\vec{u} = |u|\left(\frac{\hat{\imath}}{\sqrt{2}} + \frac{\hat{\jmath}}{\sqrt{2}}\right)$ 7) $\vec{w} = |w|\left(\cos(20^\circ)\hat{\imath} - \sin(20^\circ)\hat{\jmath}\right)$

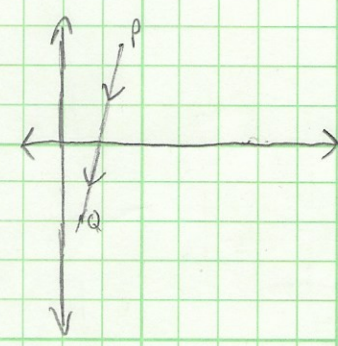
9) $P = (3,2)$ $Q = (2,7)$ $|\vec{PQ}| = \sqrt{(2-3)^2 + (7-2)^2} = \sqrt{26}$ X Not Necessary



$\boxed{\vec{PQ} = -\hat{\imath} + 5\hat{\jmath}}$

11) $P = (3,5)$ $Q = (1,-4)$

$\boxed{\vec{PQ} = -2\hat{\imath} - 9\hat{\jmath}}$



15) $5(6,2) = (30,10)$

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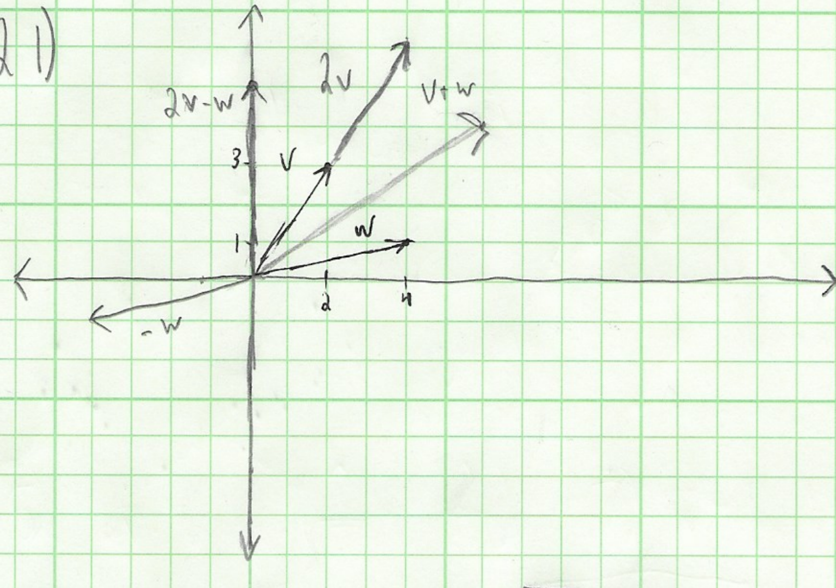
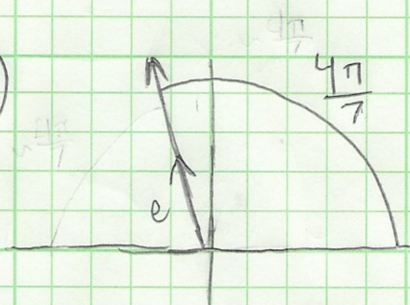
21)



41) $e_v = \dfrac{\vec{v}}{|\vec{v}|}$ $|\vec{v}| = \sqrt{3^2 + 4^2} = 5$

$\vec{v} = 3\hat{i} + 4\hat{j}$ $\boxed{e_v = \frac{3}{5}\hat{i} + \frac{4}{5}\hat{j}}$

47)



$\boxed{\vec{e} = \cos\left(\frac{4\pi}{7}\right)\hat{i} + \sin\left(\frac{4\pi}{7}\right)\hat{j}}$

Proof that this is a unit vector:

$\cos^2(x) + \sin^2(x) = 1$

11 13 19 25 27 31 49 51

12.2 HW

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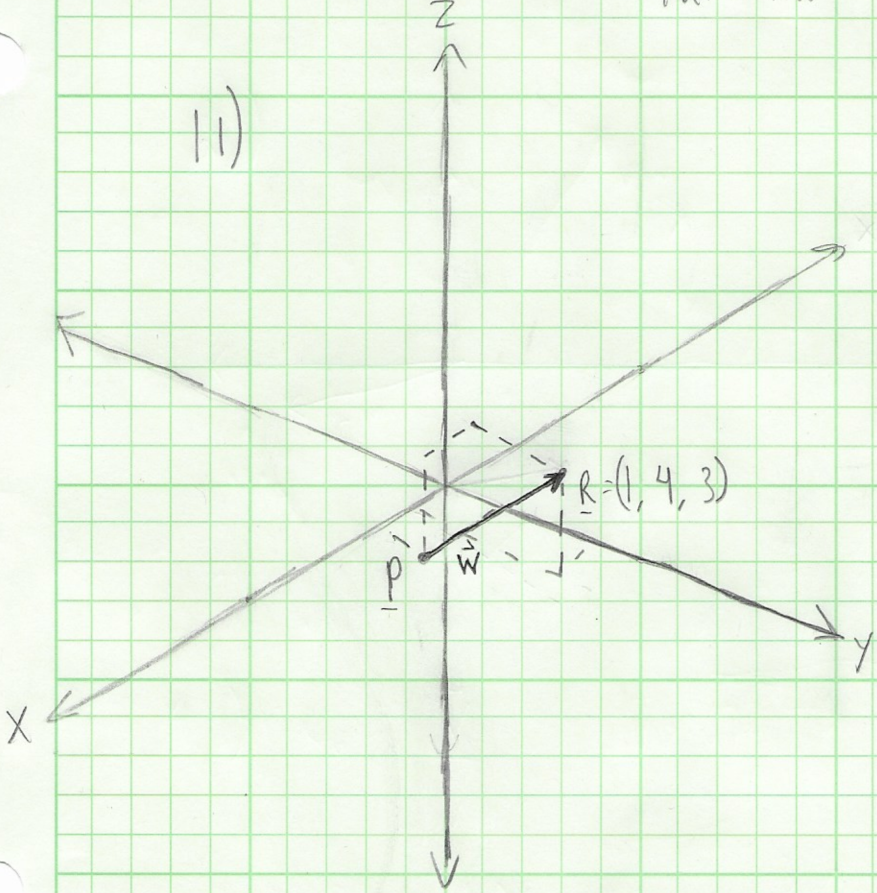
11)



If $\vec{w} = \overrightarrow{PR}$, $-\vec{w} = \overrightarrow{RP}$

$R \to P$

$P = (2, 1, 0)$

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

a) $(2, 4, 6)$ is parallel to and points in the same dir. as $\vec{v}$

b) $(-1, -2, -3)$ is parallel to $\vec{v}$ but does not pt. in the same dir.

c) $(-7, -14, -21)$ is parallel " " " " not pt. in the same dir.

d) $(6, 10, 14)$ is neither parallel nor pts in the same dir.

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19) $-2(8, 11, 3) + 4(2, 1, 1) =$

$(-16, -22, -6) + (8, 4, 4) =$

$(-8, -18, -2)$

25) $\vec{u} = (4, 2, -6)$ $\vec{v} = (2, -1, 3)$ $\boxed{\parallel ?}$

Not parallel: y & z coords change magnitude & sign consistently, but x does not

27) $\vec{u} = (-3, 1, 4)$ $\vec{v} = (6, -2, 8)$

Not parallel: vectors are not a scalar multiple of each other

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31) $\vec{v} = (-4, 4, 2)$ $\quad \vec{u}_v = \left(\frac{\vec{v}}{|\vec{v}|}\right) \cdot (-1)$

$|\vec{v}| = \sqrt{(-4)^2 + (4)^2 + (2)^2} = \sqrt{32 + 4} = \sqrt{36} = 6$

$\boxed{\vec{u}_v = \left(+\frac{2}{3}, \frac{-2}{3}, \frac{-1}{3}\right)}$

49) $r_1(t) = (5, 5, 2) + t(0, -2, 1)$

$r_2(t) = (5, 1, 4) + t(0, -2, 1)$

51) $r(t) = (-1, 2, 2) + t(4, -2, 1)$

$s(t) = (0, 1, 1) + t(2, 0, 1)$

$r_x(t) = -1 + 4t = s_x(p) = 2p$

$r_y(t) = 2 - 2t = s_y(p) = 1$

$r_z(t) = 2 + t = s_z(p) = 1 + p$

1 $-1 + 4t = 2p$

2 $2 - 2t = 1$

3 $2 + t = 1 + p$

2 + 2·3 $\quad \cancel{2} + 4 + (\cancel{-2t}) + \cancel{2t} = 1 + \cancel{2} + 2p \Rightarrow 4 = 1 + 2p \Rightarrow \boxed{\frac{3}{2} = p}$ 2

1 − 2·2 $\quad -1 - 3 + 4t = 0 \Rightarrow 4t = 4 \Rightarrow t = 1$

1 $-1 + 4(1) = 2\left(\frac{3}{2}\right)$ ✓ 2 $2 - 2(1) \neq 1$

$4 = 4$