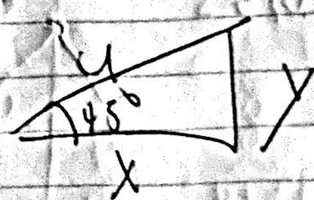
Fayed Raza
9/12/2020

12.1 and 12.2

12.1: 3, 7, 9, 11, 15, 21, 41, 47

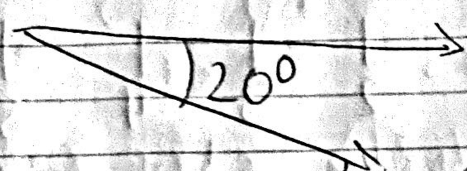
5. X component: $\cos(45) = \frac{\sqrt{2}}{2}$

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



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

7.

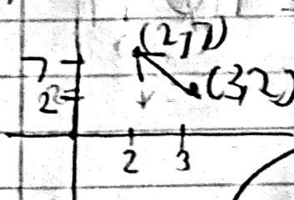


X component $\cos(-20) = 0.94$

y component $\sin(-20) = -0.342$

$\langle 0.94\|w\|, -0.342\|w\| \rangle$

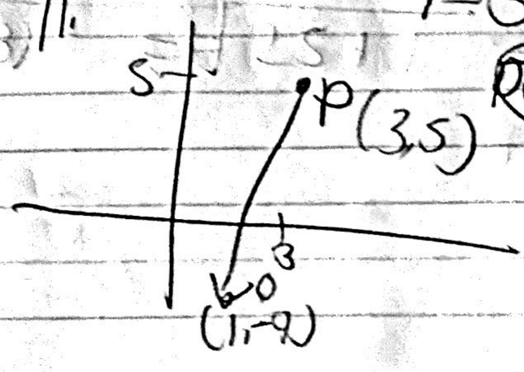
9.



$\frac{7-2}{2-3} = \frac{5}{-1}$

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

11.



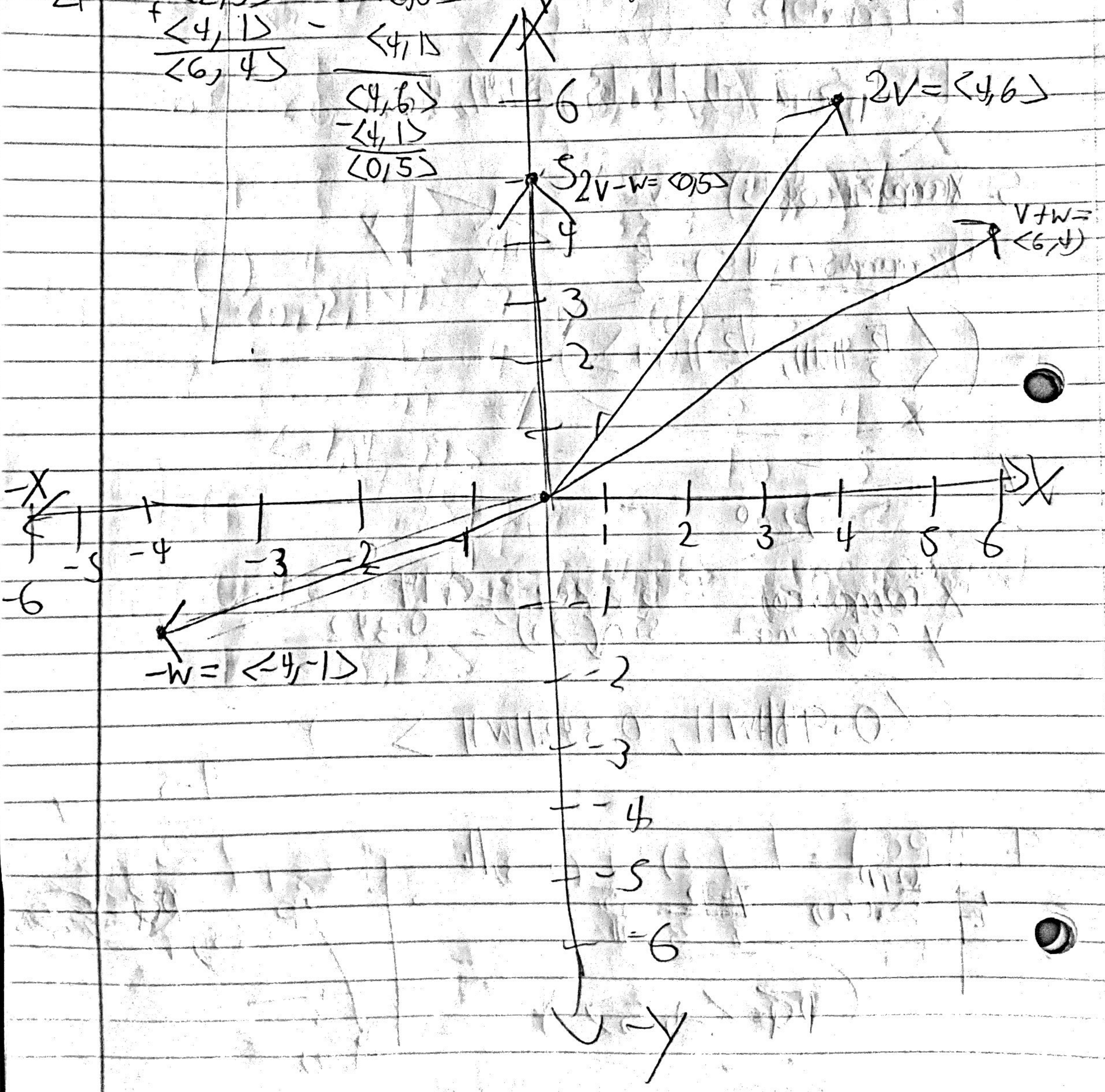
$\frac{-4-5}{1-3} = \frac{-9}{-2}$

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

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

21. $\langle 2,3\rangle + \langle 4,1\rangle = \langle 6,4\rangle$ $\quad 2\langle 2,3\rangle - \langle 4,1\rangle$ $\quad \langle -4,-1\rangle$ $\quad 2v = \langle 4,6\rangle$

$\langle 4,6\rangle - \langle 4,1\rangle = \langle 0,5\rangle$



41. $\sqrt{3^2+4^2} = \sqrt{9+16} = \sqrt{25} = 5$

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

47. $\cos\frac{4\pi}{7} = -0.22$

$\sin\frac{4\pi}{7} = 0.97$

$\langle -0.22, 0.97 \rangle$

12.2 # 11, 13, 19, 25, 27, 31, 49, 51

11. $R = \langle 1,4,3 \rangle$

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

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

$-2 = 4 - y$
$-6 = -y$
$y = 6$

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

$\langle -2, 6, 0 \rangle$

13. $2\langle 2,4,6\rangle = \langle 4,8,12\rangle$

(a) $\langle 2,4,6\rangle$ ✓ $\frac{4}{2}=2$ $\frac{8}{4}=2$ $\frac{12}{6}=2$

(b) $\langle -1,-2,-3\rangle$ $\langle 4,8,12\rangle$ $\frac{4}{-1}=-4$ X

$\frac{8}{-2}=-4$

(c) $\frac{4}{-7}$ $\frac{8}{-14}=\frac{4}{-7}$ ✓

$\frac{12}{-21}=\frac{4}{-7}$ ✓

$\langle -7,-14,-21\rangle$

(d) $\frac{4}{6}=\frac{2}{3}$

$\frac{8}{10}=\frac{4}{5}$ X

$\langle 2,4,6\rangle$ and $\langle -7,-14,-21\rangle$ are parallel to $\langle 4,8,12\rangle$

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

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

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

23. $u = \langle 4, 2, -6\rangle$

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

$\frac{4}{2} = 2 \quad \frac{2}{-1} = -2 \quad \frac{-6}{3} = -2$

u and v are not parallel

27. $u = \langle -3, 1, 4\rangle$

$v = \langle 6, -2, 8\rangle$

$\frac{-3}{6} = -\frac{1}{2} \quad \frac{1}{-2} = -\frac{1}{2} \quad \frac{4}{8} = \frac{1}{2}$

u and v are not parallel

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

$\sqrt{4^2 + 4^2 + 2^2} = \sqrt{16 + 16 + 4} = \sqrt{36} = 6$

$\langle -\frac{4}{6}, \frac{4}{6}, \frac{2}{6} \rangle = \langle -\frac{2}{3}, \frac{2}{3}, \frac{1}{3} \rangle$

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

49. $u = \langle 0, -2, 1 \rangle$

$P = (5, 5, 2)$

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

$r_2(t) = \langle 5, 5, 2 \rangle + t\langle 0, -4, 2 \rangle$ $\quad \langle 0, -4, 2 \rangle$

51 $r_1(t) = \langle -1, 2, 2 \rangle + t\langle 4, -2, 1 \rangle$

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

$r_1(t)$

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

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

$r_2(s)$

$\langle 0, 1, 1 \rangle + s\langle 2, 0, 1 \rangle$

$r(s) = 2s \quad r(s) = 1 \quad r(s) = 1 + s$

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

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

$2 - 1 = 2s \qquad t = \frac{1}{2}$

$\frac{5}{2} \neq \frac{3}{2}$

$1 = 2s$

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

Since $\frac{5}{2} \neq \frac{3}{2}$ we know that these two lines, $r_1(t)$ and $r_2(t)$ do not intersect.