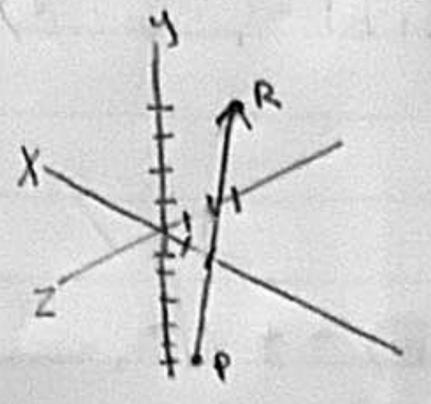
Homework 12.2 9/8/2020

11. R = (1, 4, 3) , point P

$\langle 3, -2, 3\rangle = ([1, 4, 3] - [P_x, P_y, P_z])$

$\langle [2, -6, 0] = [P_x, P_y, P_z]$



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

(a) $\frac{\langle 2, 4, 6\rangle \cdot \langle 4, 8, 12\rangle}{\sqrt{2^2+4^2+6^2} \times \sqrt{4^2+8^2+12^2}} = \frac{112}{\sqrt{56} \cdot \sqrt{224}} = 1$

(b) $\frac{\langle -7, -14, -21\rangle \cdot \langle 4, 8, 12\rangle}{\sqrt{-7^2+-14^2+-21^2} \times \sqrt{224}} = -\frac{392}{392} = -1$

(c) $\frac{\langle -1, -2, 3\rangle \cdot \langle 4, 8, 12\rangle}{\sqrt{-1^2+-2^2+3^2} \times \sqrt{4^2+8^2+12^2}} = \frac{16}{\sqrt{14} \times \sqrt{224}} = \frac{16}{56}$

(d) $\frac{\langle 6, 10, 14\rangle \cdot \langle 4, 8, 12\rangle}{\sqrt{6^2+10^2+14^2} \times \sqrt{224}} = \frac{272}{272.704}$

- parallel - (a), (b)
- Same direction - (a)

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. $\frac{u \cdot v}{|u||v|} = \frac{\langle 4, 2, -6\rangle \cdot \langle 2, -1, 3\rangle}{\sqrt{4^2+2^2+(-6)^2} \times \sqrt{2^2+(-1)^2+3^2}}$

$= \frac{-12}{28}$ not parallel

27. $\frac{u \cdot v}{|u||v|} = \frac{\langle -3, 1, 4\rangle \cdot \langle 6, -2, 8\rangle}{\sqrt{(-3)^2+1^2+4^2} \times \sqrt{6^2+(-2)^2+8^2}}$

$= \frac{52}{52}$ parallel

31. unit vectors opposite direction to $v = \langle -4, 4, 2 \rangle$

$mag = \sqrt{(4)^2 + 4^2 + 2^2} = \sqrt{36} = 6$

$\left[\frac{4}{6}, \frac{-4}{6}, \frac{-2}{6} \right] = \left[\frac{2}{3}, \frac{-2}{3}, \frac{-1}{3} \right]$

49. $P = (5, 5, 2)$ $v = \langle 0, -2, 1 \rangle$

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

$r(t) = (5, 5, 2) - t\langle 0, -2, 1 \rangle$
$r(t) = (5, 5, 2) - \langle 0, -2t, t \rangle$
$r(t) = \langle 5, 5 + 2t, 2 - t \rangle$
$x(t) = 5 \quad y(t) = 5 + 2t \quad z(t) = 2 + t$

51. $r_1(t) = \langle -1, 2, 2 \rangle + t\langle 4, -2, 1 \rangle$
$r_1(t) = (-1 + 4t, 2 - 2t, 2 + t)$
$x(t) = 4t - 1 \quad y(t) = 2 - 2t \quad z(t) = 2 + t$

$r_2(s) = \langle 0, 1, 1 \rangle + s\langle 2, 0, 1 \rangle$
$= \langle 2s, 1, 1 + s \rangle$
$x(s) = 2s \quad y(s) = 1 \quad z(s) = 1 + s$

$4t - 1 = 2s$
$4(-2 + s) - 1 = 2s$
$-8 + s - 1 = 2s$
$s - 9 = 2s$
$-9 = s$

$2 - 2t = 1$
$2 - 2(-2 + s) = 1$
$2 + 4 - 2s = 1$
$-2s = -7$
$2s = 7$

$2 + t = 1 + s$
$t = -2 + s$

$2(-9) = 7$
X

The lines do not intersect because there is no point where one of their components equals each other