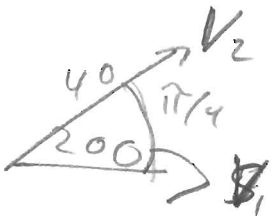


$V_1 = 200 \langle \cancel{\cos} 1, 0 \rangle$

$V_2 = 40 \langle \cos \pi/4, \sin \pi/4 \rangle$

$= 40 \langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \rangle$

$= \langle 20\sqrt{2}, 20\sqrt{2} \rangle$

12.2) $V = V_1 + V_2 = \langle 200 + 20\sqrt{2}, 20\sqrt{2} \rangle$

14] B-A Q-P Yes $\langle 2, 2, 2 \rangle$

16] Yes ✓ $\langle -4, 2, 3 \rangle$

24] $u = \langle 1, 0, 7 \rangle$

$\frac{u}{\|u\|} = \frac{\langle 1, 0, 7 \rangle}{\sqrt{1^2 + 49}} = \langle \frac{1}{\cancel{\cos}5\sqrt{2}}, 0, \frac{7}{5\sqrt{2}} \rangle$

28] $\vec{r}(t) = \langle 4, 0, 8 \rangle + t \langle 1, 0, 1 \rangle$

32] $\vec{r}(t) = \langle -2, 0, -2 \rangle + t \langle 6, 3, 9 \rangle$

or $= (1-t)\langle -2, 0, -2 \rangle + t \langle 4, 3, 7 \rangle$

36] $\vec{r}(t) = \langle 1, -1, 2 \rangle + t \langle 0, 1, 0 \rangle$

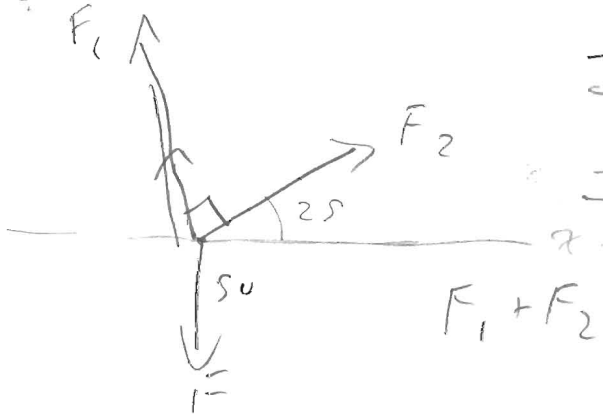
42] $\vec{r}(t) = (1-t)\langle 2, \overset{P}{1}, -1 \rangle + t \langle 4, \overset{Q}{7}, 7 \rangle$

$\vec{r}(\frac{2}{3}) = \ldots$

Fibrations

$$\begin{array}{ccc} F & \longrightarrow & E \\ & & \downarrow \\ & & B \end{array}$$

Cofibrations



$$\begin{array}{r} 180 \\ -65 \\ \hline 115 \\ -25 \\ \hline 90 \end{array}$$

$$F_1 + F_2 + F = 0$$

$$F_1 = f_1 \langle \cos 25, \sin 25 \rangle$$

$$F_2 = f_2 \langle \cos 115, \sin 115 \rangle$$

$$F = \langle 0, -50 \rangle$$

$$f_1 \cos 25 + f_2 \cos 115 + 0 = 0$$

$$f_1 \sin 25 + f_2 \sin 115 - 50 = 0$$

$$f_1 = f_2 \frac{\cos 115}{\cos 25}$$

$$f_2 \frac{\cos 115}{\cos 25} \sin 25 + f_2 \sin 115 - 50 = 0$$

$$f_2 (\tan 25 \cos 115 + \sin 115) - 50 = 0$$

$$f_2 = \frac{50}{\tan 25 \cos 115 + \sin 115}$$

$$f_1 = f_2 \frac{\cos 115}{\cos 25}$$

12.)

14) $\langle 1,1,1\rangle \cdot \langle 3,-2,-1\rangle$

$= 3 - 2 - 1 = 0$

orth

28) $\cos^{-1}\left(\frac{v \cdot w}{\|v\|\|w\|}\right) = \cos\theta$

$\frac{1 - 1 + 25}{\sqrt{27}\sqrt{27}} = \cos\theta$

$\frac{25}{27} = \cos\theta$

$\cos^{-1}\left(\frac{25}{27}\right) = \theta$

38) $v^2 + 2v \cdot w + w^2 - 2v \cdot w$

$= v^2 + w^2$

40) $v^2 + w \cdot v - v \cdot w + w^2$

$= v^2 + w^2$

44) $\text{proj}_v(u) = \left(\frac{u \cdot v}{v \cdot v}\right) v$

$= \left(\frac{18}{2}\right)$

48) $u = \langle a, a, b\rangle$ $v = i - j$

$= (1, -1, 0)$

$\left(\frac{a - a}{2}\right)(1, -1, 0)$ ok!

$= 0$

52) $q = q_{\parallel} + q_{\perp}$

60) $v_1 = \langle -10, 2 \rangle$

$v_2 = \langle -7, -6 \rangle$

$$\cos\theta = \frac{v \cdot w}{\|v\|\|w\|}$$

$$= \frac{70 - 12}{\sqrt{104}\sqrt{49+36}} = \frac{58}{2\cdot 13\sqrt{10}}$$

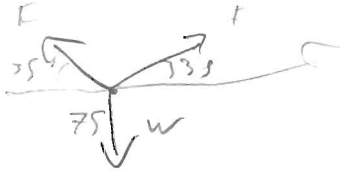
$104 = 52 \cdot 2 = 2 \cdot 2 \cdot 26 = 2 \cdot 2 \cdot 13$

$85 = 5 \cdot 17$

$\|85\|$

$$\theta = \cos^{-1}\left(\frac{58}{26\sqrt{10}}\right)$$

70)



Let $f = \|F\|$

$F + F + w = 0 \iff 2F + w = 0$

$F = f\langle \cos 35, \sin 35 \rangle$

$w = \langle 0, -75 \rangle$

$2f\cos 35 + 0 = 0$

$2f\sin 35 - 75 = 0$

$F_L = f\langle \cos 35, \sin 35 \rangle$

$F_R = f\langle \cos 35, \sin 35 \rangle$

$w = \langle 0, -75 \rangle$

73)

Want to show

$\overrightarrow{RP} \cdot \overrightarrow{RQ} = 0$

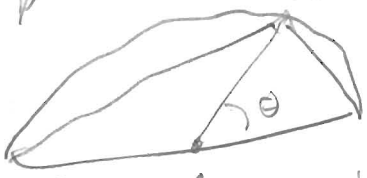
Will $\overrightarrow{RP} \cdot \overrightarrow{RQ}$

$= \|\overrightarrow{RP}\| \|\overrightarrow{RQ}\| \cos\theta$

$\|\overrightarrow{OR}\| = r$

$\|\overrightarrow{OP}\| = r$

$r\langle \cos\theta, \sin\theta \rangle$



$\langle r, 0 \rangle$

$\langle -r, 0 \rangle$

$(r - r\cos\theta, -r\sin\theta) \cdot (-r - r\cos\theta, r\sin\theta)$

$= -r^2 + r^2\cos^2\theta + r^2\sin^2\theta = 0$

$F_L + F_R + w = 0$

$-f\cos 35 + f\cos 35 + 0 = 0$

$f\sin 35 + f\cos 35 - 75 = 0$

$f\langle \sin 35 + \cos 35 \rangle = 75$

$$f = \frac{75}{\sin 35 + \cos 35}$$

12.4

4)

6)

14) $\begin{vmatrix} i & j & k \\ 0 & 1 & -1 \\ 1 & -1 & 0 \end{vmatrix} = -i - (1)j + (-1)k$

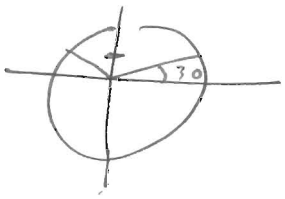
$= \langle -1, -1, -1 \rangle$

20) $\begin{vmatrix} i & j & k \\ 2 & -3 & 4 \\ 1 & 1 & -7 \end{vmatrix} = i(21-4)$

32) $\|v \times w\| = \|v\| \|w\| |\sin\theta|$

$\frac{1}{2} = 1 \cdot 1 \cdot |\sin\theta|$

$\sin\theta = \pm \frac{1}{2}$



~~30, 90+60~~

~~$\frac{\pi}{6}$, $\frac{5\pi}{6}$~~ $0 \le \frac{\pi}{6}, \frac{5\pi}{6} \le \pi$

34) $\pm \frac{a \times b}{\|a \times b\|}$

42) $V = |\det(\quad)|$

48)

$$\frac{1}{2} \| \overrightarrow{PQ} \times \overrightarrow{PR} \|$$

53) !!!

$$(i+j) \times j = k \times j = -i$$

$$i \times (j \times j) = i \times 0 = 0$$

61)

WTF: $\begin{vmatrix} i & j & k \\ 1 & 1 & 1 \\ a & b & c \end{vmatrix} = i_{\frac{1}{2}} - j$

$$i(c-b) - j(c-a) + k(b-a)$$

$c - b = 1$

~~$c + a =$~~

$c - a = 1$

$b - a = 6$