Lyell c Read — CH 11.4 Homework — 10/2/2018

1-8 4K | K in 3..11

1) $|u \times v| = \boxed{|u||v|\sin\theta}$ 2) Right-Hand Rule Fingers u → v Thumb

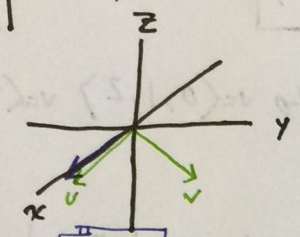
3) $|v \times v| = |v||v|\sin(0) = \boxed{0}$ 4) $|u \times v| = |u||v|\sin(90) = \boxed{|u||v|}$

5) $u \times v = \begin{vmatrix} i & j & K \\ u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \end{vmatrix}$ 6) $\tau = |F||L|\sin\theta = F \times L$ 7) $\langle 0, 0, 15 \rangle$

8) $\langle 0, 8, 0 \rangle$

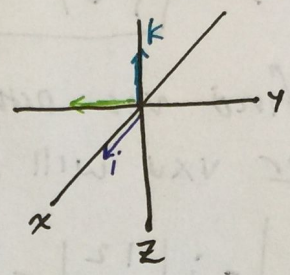
12) $u = \langle 0, -2, -2 \rangle$

$v = \langle 0, 2, -2 \rangle$



$u \times v = |v||v|\sin(90) = \boxed{2\sqrt{8}\, i}$

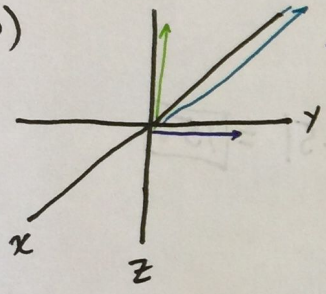
16)



i K

$i \times K = \boxed{-j}$

20)



$2j \times -5i = \boxed{10K}$

24) $u = \langle 6, 2, -3 \rangle$ find A of ▱

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

$A_{▱} = u \times v =$ ▱

- doing #23 instead for ans

23) $u = \langle 2, -1, -2 \rangle$ $v = \langle 3, 2, -1 \rangle$ Find A of ▱

$$u \times v = \begin{vmatrix} +i & -j & +K \\ 2 & -1 & -2 \\ 3 & 2 & -1 \end{vmatrix} = +i\begin{vmatrix} -1 & -2 \\ 2 & -1 \end{vmatrix} - j\begin{vmatrix} 2 & -2 \\ 3 & -1 \end{vmatrix} + K\begin{vmatrix} 2 & -1 \\ 3 & 2 \end{vmatrix} = 5i - 4j + 7K$$

$1 + 4 = 5$ $(-2 + 6) =$ $4 + 3$

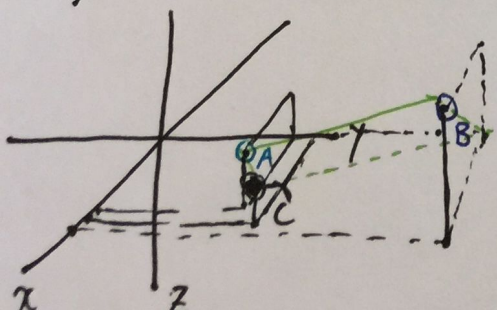
$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$

$A = |\langle 5, -4, 7 \rangle|$

$= \sqrt{25 + 16 + 49}$

$= \sqrt{90}$

27) (sub for 28) A: (5, 6, 2) B: (7, 16, 4) C: (6, 7, 3)



vectors used: $\overrightarrow{AB}$ $\overrightarrow{AC}$

$\overrightarrow{AB}$: $B - A = \langle 7-5, 16-6, 4-2 \rangle = \langle 2, 10, 2 \rangle$

$\overrightarrow{AC}$: $C - A = \langle 6-5, 7-6, 3-2 \rangle = \langle 1, 1, 1 \rangle$

$$A_{▱} = |AB \times AC| = \begin{vmatrix} i & j & K \\ 2 & 10 & 2 \\ 1 & 1 & 1 \end{vmatrix} = i\begin{vmatrix} 10 & 2 \\ 1 & 1 \end{vmatrix} - j\begin{vmatrix} 2 & 2 \\ 1 & 1 \end{vmatrix} + K\begin{vmatrix} 2 & 10 \\ 1 & 1 \end{vmatrix} = \langle 8, 0, -8 \rangle$$

$(10 - 2)$ (0) $(2 - 10)$

$= \sqrt{16 + 16} = \sqrt{32} = 4\sqrt{2}$

31) (sub for 32) $u=\langle 2,3,-9\rangle$ $v=\langle -1,1,-1\rangle$

$$u\times v = \begin{vmatrix} i & -j & K \\ 2 & 3 & -9 \\ -1 & 1 & -1 \end{vmatrix} = i\begin{vmatrix} 3 & -9 \\ 1 & -1 \end{vmatrix} - j\begin{vmatrix} 2 & -9 \\ -1 & -1 \end{vmatrix} + K\begin{vmatrix} 2 & 3 \\ -1 & 1 \end{vmatrix} = \boxed{\langle 6, 11, 5\rangle}$$

$$(-3+9) - (-2-9) + (2+3)$$

$$v\times u = -(u\times v) = \boxed{\langle -6, -11, -5\rangle}$$

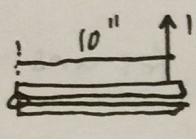
35) (sub for 36) find vec ortho to $u=\langle 0,1,2\rangle$ $v=\langle -2,0,3\rangle$

- either $u\times v$ or $v\times u$ will do...

$$u\times v = \begin{vmatrix} i & -j & K \\ 0 & 1 & 2 \\ -2 & 0 & 3 \end{vmatrix} = i\begin{vmatrix} 1 & 2 \\ 0 & 3 \end{vmatrix} - j\begin{vmatrix} 0 & 2 \\ -2 & 3 \end{vmatrix} + K\begin{vmatrix} 0 & 1 \\ -2 & 0 \end{vmatrix} = \boxed{\langle 3, -4, 2\rangle}$$

$$(3-0) - (0+4) + (0+2)$$

~~36)~~ 40)



$\tau_{hinge} = |F||L|\sin 90 = |10||1.5| = \boxed{15}$ (sin 90 = 1)

49) just another Torque problem... ↑

62) $u\cdot(v\times w) = u\cdot\begin{vmatrix} i & j & K \\ v_1 & v_2 & v_3 \\ w_1 & w_2 & w_3 \end{vmatrix} = i\begin{vmatrix} v_2 & v_3 \\ w_2 & w_3 \end{vmatrix} - j\begin{vmatrix} v_1 & v_3 \\ w_1 & w_3 \end{vmatrix} + K\begin{vmatrix} v_1 & v_2 \\ w_1 & w_2 \end{vmatrix}$

dot u

$= \langle i(v_2w_3 - v_3w_2) - j(v_1w_3 - v_3w_1) + K(v_1w_2 - v_2w_1)\rangle$

$= \langle u(v_2w_3 - v_3w_2), -u(v_1w_3 - v_3w_1), u(v_1w_2 - v_2w_1)\rangle$

basically, i, j, k are "replaced" with u which is the same as dot product

63) find value for height, dot and cross. Not going to do b/c YouTube ☺