Lyell C Read — CH 11.3 Homework — 9/26/2018

1-8, 4K | K in [3..11]

1) u dot $\boxed{v = |u||v|\cos\theta}$

2) if $\vec{u} = \langle u_1, u_2, u_3\rangle$ and $\vec{v} = \langle v_1, v_2, v_3\rangle$

then $\boxed{\vec{u}\cdot\vec{v} = u_1v_1 + u_2v_2 + u_3v_3}$

3) $\langle 2, 3, -6\rangle \circ \langle 1, -8, 3\rangle$

$= 2 - 24 - 18 = -22 - 18 = \boxed{-40}$

4) Because orthogonality means $\theta = 90°$

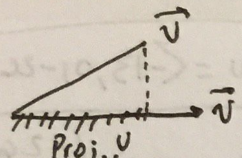
$|\vec{v}_1||\vec{v}_2|\cos 90 = \boxed{0}$ if $v_1, v_2 \perp$

5) Angle between $\vec{v}_1, \vec{v}_2$

$v_1 \cdot v_2 = |v_1||v_2| \cdot \cos\theta_{bet.}$

$\therefore \boxed{\cos\theta_{bet} = \dfrac{v_1 \cdot v_2}{|v_1||v_2|}}$

6)



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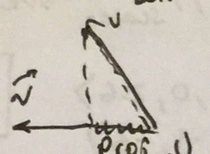
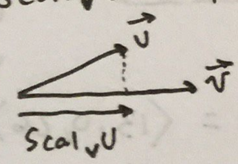


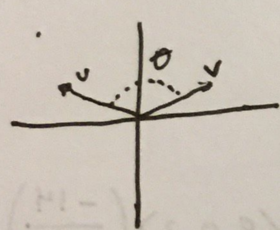
7) $\text{Scal}_v u = |u|\cos\theta = x\text{-comp } u$



is signed lenght of proj$_v u$

8) $W = |F||d|\cos\theta = \boxed{F \cdot d}$

12) $u = \langle -\sqrt{3}, 1\rangle$ $v = \langle \sqrt{3}, 1\rangle$



$\theta = \cos^{-1}\left(\dfrac{u \cdot v}{|u||v|}\right)$

$\theta = \cos^{-1}\left(\dfrac{-3+1}{2\cdot 2}\right) =$

$\theta = \cos^{-1}\left(\dfrac{-2}{4}\right) = \cancel{1.047}$

$\boxed{\theta = \dfrac{2\pi}{3}}$

$u \cdot v = |u||v|\cos\theta$ $\quad | \theta = \dfrac{2\pi}{3}$

$-3+1 = 2 \cdot 2 \cdot \cos\dfrac{2\pi}{3}$

$-2 = 4 \cdot -\dfrac{1}{2}$

$-2 = -2$

$u \cdot v = \boxed{-2}$

16) $u = \langle 10, 0\rangle$ $v = \langle -5, 5\rangle$ $\theta = \cos^{-1}\left(\dfrac{u \cdot v}{|u||v|}\right) = \left(\dfrac{-50}{10\cdot\sqrt{50}}\right)\cos^{-1}$

$\boxed{\theta = \dfrac{3\pi}{4}}$

$u \cdot v = -50 + 0$

$\boxed{u \cdot v = -50}$

17) (to check ans)

$u = i = \langle 1, 0\rangle$

$v = i + \sqrt{3} i = \langle 1, \sqrt{3}\rangle$

$u \cdot v = 1 + 0 = \boxed{1}$

$\theta = \cos^{-1}\left(\dfrac{1}{1\cdot 2}\right) = \left(\cos^{-1}\left(\dfrac{1}{2}\right)\right) = \boxed{\dfrac{\pi}{3}}$

20) $u = \langle 3,4,0\rangle$ $v = \langle 0,4,5\rangle$ $\theta = \cos^{-1}\left(\frac{u\cdot v}{|u||v|}\right) = \left(\frac{16}{5\sqrt{41}}\right)$

$\sqrt{9+16} = 5$

$\sqrt{16+25} = \sqrt{41}$ $= \boxed{1.047 \text{ rad}}$ $\sim 60^\circ \sim \frac{\pi}{3}$

$u\cdot v = 0 + 16 + 0 = \boxed{16}$

21) (to check ans)

$u = \langle -10, 0, 4\rangle$

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

$\boxed{u\cdot v = -10 + 12 = 2}$

$\theta = \cos^{-1}\left(\frac{u\cdot v}{|u||v|}\right) = \cos^{-1}\left(\frac{2}{\sqrt{116}\cdot\sqrt{14}}\right)$

$\boxed{\theta \cong 87.15^\circ}$

29) [same ish as #20] 28) $\langle -2, -2\rangle$, -2 * NOT SURE ABOUT THIS
proj. scalar

33) (to test, then 32) $u = \langle -8, 0, 2\rangle$ $v = \langle 1, 3, -3\rangle$

$\text{proj}_v u = v\left(\frac{u\cdot v}{v\cdot v}\right) = \langle 1,3,-3\rangle\left(\frac{-8+0+-6}{1+9+9}\right) = \boxed{\frac{-14}{19}\langle 1,3,-3\rangle}$

$\text{scal}_v u = \frac{u\cdot v}{|v|} = \frac{-8+0+-6}{\sqrt{19}} = \boxed{\frac{-14}{\sqrt{19}}}$

32) $u = \langle 13, 0, 26\rangle$ $v = \langle 4, -1, -3\rangle$

$\text{proj}_v u = v\left(\frac{u\cdot v}{v\cdot v}\right) = \frac{52+0-72}{16+1+9} = \frac{-26}{26} = \boxed{-1}\boxed{\langle 4,-1,-3\rangle} = \boxed{\langle -4, 1, 3\rangle}$

$\text{scal}_v u = \frac{u\cdot v}{|v|} = \boxed{\frac{-26}{\sqrt{26}}}$

36) $u = i + 4j + 7k$ $v = 2i - 4j + 2k \rightsquigarrow u = \langle 1, 4, 7\rangle$ $v = \langle 2, -4, 2\rangle$

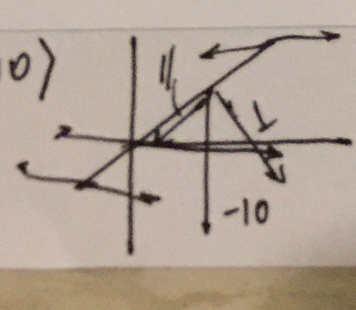
$\text{proj}_v u = v\left(\frac{u\cdot v}{v\cdot v}\right) = v\left(\frac{2-16+14}{4+16+4}\right) = v\,(0) = \boxed{\langle 0,0,0\rangle}$

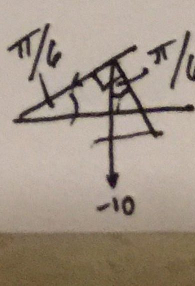
$\text{scal}_v u = \frac{u\cdot v}{|v|} = \boxed{0}$

40) $F = \langle 4,3,2\rangle$ $d = \langle 8,6,0\rangle$ $W = F\cdot d$ $W = 24 + 18 + 0 = \boxed{W = 42\text{ J}}$

41) (for check) $F = \langle 40, 30\rangle$ $d = \langle 10, 0\rangle$ assumed ☺ $W = \boxed{400\text{ J}}$

44) F_{vert} $\langle 0, -10\rangle$





$|F_\perp| = 10\cos\frac{\pi}{6} = \boxed{\frac{10\sqrt{3}}{2}}$

$|F_\parallel| = 10\sin\frac{\pi}{6} = \boxed{\frac{10}{2}}$