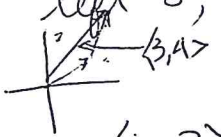
HW #9 p 425-7

1) directed line segment see p 416
2) initial, terminal
3) vector
4) magnitude, direction } so it doesn't matter where they start
5) standard position
6) unit vector
7) scalar multiplication; vector addition
8) linear combination; horizontal, vertical

15) $v = \langle 1, 3 \rangle$ $\|v\|$ $\sqrt{1^2+3^2} = \sqrt{10}$

18) $v = \langle 7, 0 \rangle$ $\|v\|$ 7

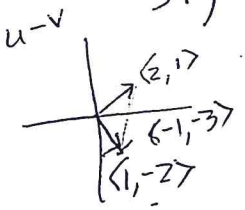
19) $(-3, -5)$ $(-11, 1)$ left 8, up 6 $\langle -8, 6 \rangle$ $\|v\| = 10$

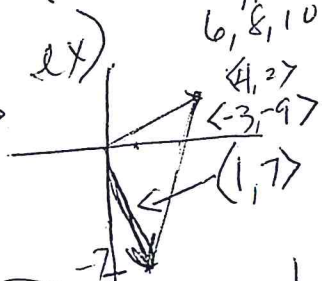


31) $u = \langle 2, 1 \rangle$ $v = \langle 1, 3 \rangle$

$u + v = \langle 3, 4 \rangle$ $u - v = \langle 1, -2 \rangle$

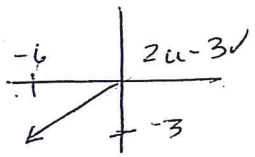
$2u - 3v = \langle 4, 2 \rangle - \langle 3, 9 \rangle = \langle 1, -7 \rangle$





34) $u = \langle 0, 0 \rangle$ $v = \langle 2, 1 \rangle$ $u + v = \langle 2, 1 \rangle$

$2u - 3v = \langle -6, -3 \rangle$ $u - v = \langle -2, -1 \rangle$



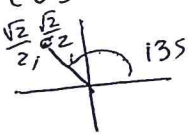
37) ~~5u~~ $u = \langle 2, 0 \rangle$ $5u = \langle 10, 0 \rangle$

$\|5u\| = 10$

51) $\langle -2, 1 \rangle + \langle 3, -2 \rangle = \langle 5, -3 \rangle =$ ~~$5i - 3j$~~ $5i - 3j$

52) ~~$\langle 0, -2 \rangle$ $\langle 3, 6 \rangle$~~ $\langle 3, 8 \rangle$ $3i + 8j$

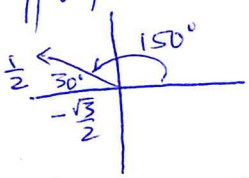
64) $v = 8(\cos 135° i + \sin 135° j)$ $\langle -4\sqrt{2}, 4\sqrt{2} \rangle$



~~magnitude~~ magnitude = 8

direction $\theta = 135°$

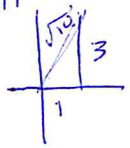
67) $\|v\| = \frac{7}{2}$ $\theta = 150°$



$\frac{7}{2}(\cos 150° i + \sin 150° j)$

$\frac{7}{2}\left\langle -\frac{\sqrt{3}}{2}, \frac{1}{2}\right\rangle = \left\langle \frac{-7\sqrt{3}}{4}, \frac{7}{4}\right\rangle$

70) $\|v\| = 2$ $i + 3j$



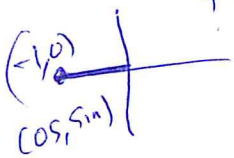
$\sqrt{1^2+3^2} = \sqrt{10} = \|v\|$ $\frac{\langle 1,3\rangle}{\sqrt{10}}$ $\frac{1}{\sqrt{10}}\cdot 2 \; \frac{3}{\sqrt{10}}\cdot 2 = \frac{2}{\sqrt{10}}, \frac{6}{\sqrt{10}}$

$\frac{2\sqrt{10}}{10}$ $\frac{6\sqrt{10}}{10} = \left\langle \frac{\sqrt{10}}{5}, \frac{3\sqrt{10}}{5}\right\rangle$

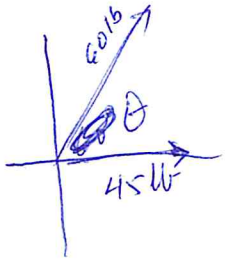
72) $20(\cos 45° i + \sin 45° j) = 20\left\langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right\rangle = \langle 10\sqrt{2}, 10\sqrt{2}\rangle$

$+50(\cos 180° i + \sin 180° j) = 50\langle -1, 0\rangle + \langle -50, 0\rangle$

$= \langle 10\sqrt{2} - 50, 10\sqrt{2}\rangle$



75)



$45\cos 0 + 45\sin\theta = 45i$

$60\cos\theta i + 60\sin\theta j =$ $u+v = 45i + 60\cos\theta i + 60\sin\theta j$

$= (45 + 60\cos\theta)i + 60\sin\theta j$

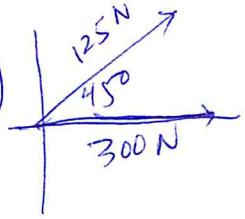
$\|u+v\| 90$ $90 = \sqrt{(45+60\cos\theta)^2 + (60\sin\theta)^2}$

$8100 = 2025 + 5400\cos\theta + 3600\cos^2\theta + 3600\sin^2\theta$

$8100 = 5400\cos\theta + 2025 + 3600$

$\frac{2475}{5400} = \frac{5400\cos\theta}{5400}$ $\cos^{-1}\left(\frac{2475}{5400}\right) \approx$ 62.720°

79)



$\langle 300, 0\rangle + 125\left\langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right\rangle = \langle 300 + 62.5\sqrt{2}, 62.5\sqrt{2}\rangle$

$= \langle 388.388, 88.388\rangle$

$\tan^{-1}\left(\frac{88.388}{388.388}\right) \approx$ 12.82° $\|\;\| = \sqrt{388.388^2 + 88.388^2}$

$\approx$ 398.319 Newtons

93) see sketch in book

$875(\cos 302° i + \sin 302° j) = 875\langle .5299, -.848\rangle \approx \langle 463.479, -742.042\rangle$

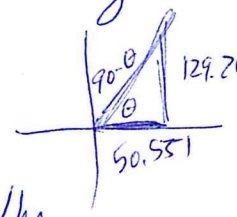
$800(\cos 310° i + \cos 310° j) = 800\langle .6428, -.766\rangle = \langle 514.230, -612.836\rangle$

subtract new from original to get wind $\longrightarrow$ $\langle 50.551, 129.206\rangle$

change to trig

$\tan^{-1}\left(\frac{129.206}{50.551}\right) \approx 68.632°$

$90 - \theta \approx N21.4° E$



$\sqrt{129.206^2 + 50.551^2} \approx$ 138.7 km/hr.