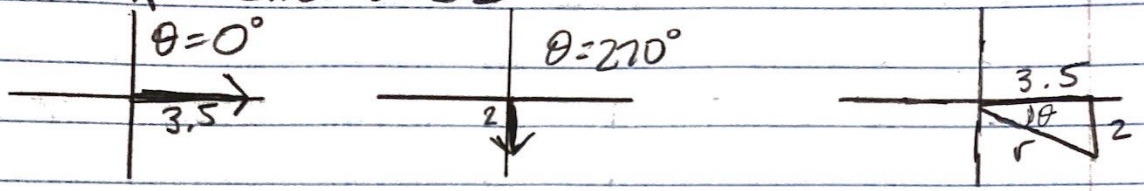
Vector Application WS I

1.



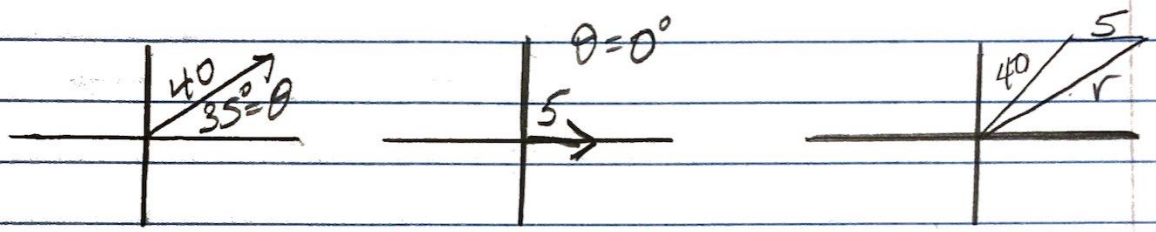
a) $r = 3.5\langle \cos 0°, \sin 0° \rangle + 2\langle \cos 270°, \sin 270° \rangle$

$r = \langle 3.5, -2 \rangle$

$\|r\| = \sqrt{(3.5)^2 + (-2)^2} = \sqrt{12.25+4} = \sqrt{16.25} =$ **4.03 ft/sec**

b) $\theta = \tan^{-1}\left(\frac{-2}{3.5}\right) = -29.74°$ **E 29.74° S**

2.



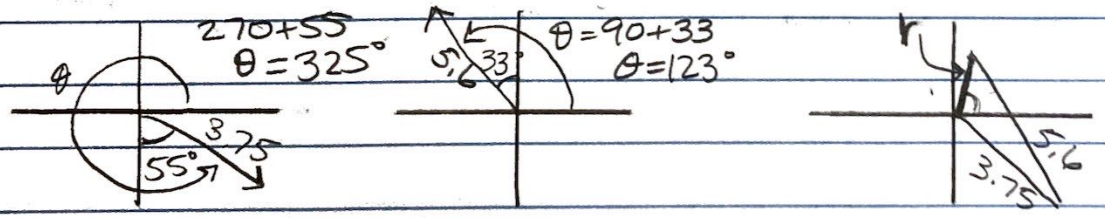
$r = 40\langle \cos 35°, \sin 35° \rangle + 5\langle \cos 0°, \sin 0° \rangle$

$r = \langle 37.77, 22.94 \rangle$

$\|r\| = \sqrt{(37.77)^2 + (22.94)^2} =$ **44.19 mph** ← resultant speed

$\theta = \tan^{-1}\left(\frac{22.94}{37.77}\right) = 31.27°$ **E 31.27° N** direction

3.



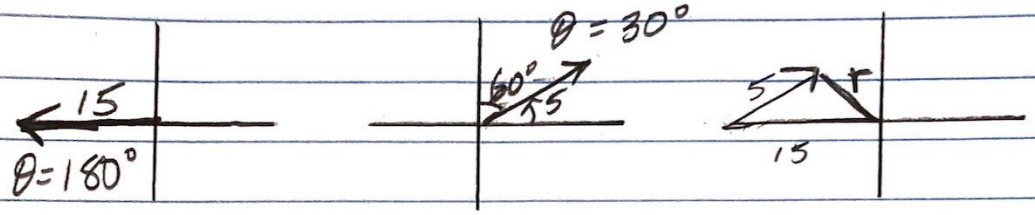
$r = 3.75\langle \cos 325°, \sin 325° \rangle + 5.6\langle \cos 123°, \sin 123° \rangle$

$r = \langle .02, 2.55 \rangle$

$\|r\| = \sqrt{(.02)^2 + (2.55)^2} =$ **2.55 Km** distance

$\theta = \tan^{-1}\left(\frac{2.55}{.02}\right) = 89.55°$ **E 89.55° N** direction

4.

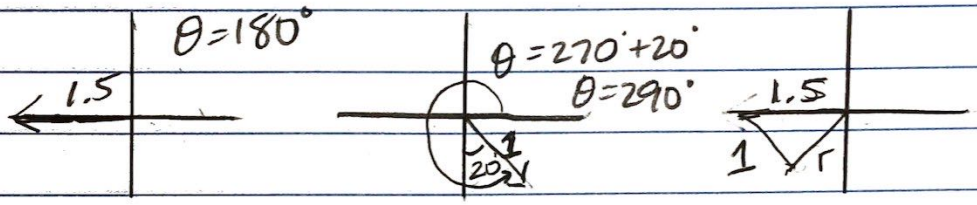


$r = 15\langle \cos 180°, \sin 180° \rangle + 5\langle \cos 30°, \sin 30° \rangle$

$r = \langle -10.67, 2.5 \rangle$

$\|r\| = \sqrt{(-10.67)^2 + (2.5)^2} =$ **10.96 mph** ← resultant speed

5.



$r = 1.5\langle \cos 180°, \sin 180° \rangle + 1\langle \cos 290°, \sin 290° \rangle$

$r = \langle -1.16, -.94 \rangle$

$\|r\| = \sqrt{(-1.16)^2 + (-.94)^2} =$ **1.49 mps** resulting speed

$\theta = \tan^{-1}\left(\frac{-.94}{-1.16}\right) = 39.02°$ **W 39.02° S** bearing