Review Problems

1. $\langle 2, -1 \rangle - \langle 4, 2 \rangle$

$\langle -2, -3 \rangle$ $\quad -2i - 3j$

2. $2\langle 2, -1 \rangle - 3\langle 1, -3 \rangle$

$\langle 4, -2 \rangle - \langle 3, -9 \rangle$

$\langle 1, 7 \rangle$ $\quad i + 7j$ — 1 pt

3. $\| u + v \| = \| \langle 6, 1 \rangle \|$

$\sqrt{6^2 + 1^2} = \sqrt{37}$

4. $| \langle 1, -3 \rangle - 2\langle 2, -1 \rangle |$

$| \langle 1, -3 \rangle - \langle 4, -2 \rangle |$

$\| \langle -3, -1 \rangle \|$

$\sqrt{9+1} = \sqrt{10}$ — 1 pt

7. $\vec{AB} = \langle 1, 2 \rangle$

$3\vec{AB} = \langle 3, 6 \rangle$

$\| 3\vec{AB} \| = \sqrt{9 + 36} = \sqrt{45} < \frac{9}{5} \quad 3\sqrt{5}$

8. $\langle 1, 2 \rangle + \langle +5, -7 \rangle$

$= \langle 6, -5 \rangle$ — 1 pt

magnitude: $\sqrt{36 + 25}$

$= \sqrt{61}$ — 1 pt

9. $\langle -6, 3 \rangle + \langle -2, -6 \rangle$

$\langle -8, -3 \rangle$

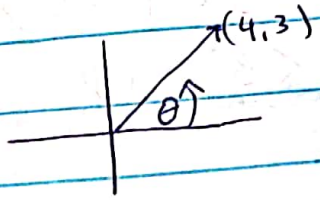
$\sqrt{64 + 9} = \sqrt{73}$

10. $\langle 5, -7 \rangle + \langle 1, 2 \rangle$

$\langle 6, -5 \rangle$

$\sqrt{61}$

13. $u = \langle 4, 3 \rangle$

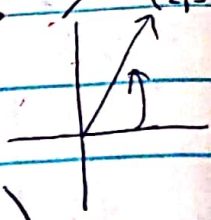


$\tan\theta = \frac{3}{4}$

$\theta = \tan^{-1}\left(\frac{3}{4}\right)$

36.87°

$v = \langle 2, 5 \rangle$

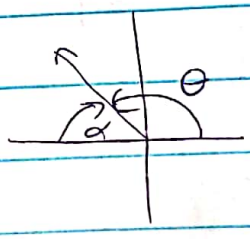


$\tan\theta = \frac{5}{2}$

$\theta = \tan^{-1}\left(\frac{5}{2}\right)$

68.20°

14. $u = \langle -2, 4 \rangle$



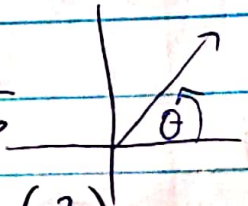
$\tan\alpha = \frac{4}{-2}$

$\alpha = \tan^{-1}(-2)$

$\theta =$ +180

1pt **116.57°**

$v = \langle 6, 4 \rangle$



$\tan\theta = \frac{4}{6}$

$\theta = \tan^{-1}\left(\frac{2}{3}\right)$

1pt. **33.69°**

15. $(-2.5\cos(25°), -2.5\sin(25°))$

$(-2.27, -1.06)$

16. $(-3.1\cos 135°, -3.1\sin 135°)$ $\left(\frac{31}{20}\sqrt{2}, -\frac{31}{20}\sqrt{2}\right)$

1pt $(3.1\sqrt{2}/2, -3.1\sqrt{2}/2)$ $(1.55\sqrt{2}, -1.55\sqrt{2})$

17. $(2\cos(-\pi/4), 2\sin(-\pi/4))$

1 pt

$2\sqrt{2}/2 \qquad -2\sqrt{2}/2$

$(\sqrt{2}, -\sqrt{2})$

18. $(3.6\cos 3\pi/4, 3.6\sin 3\pi/4)$

$(-3.6\sqrt{2}/2, 3.6\sqrt{2}/2) = (1.8\sqrt{2}, 1.8\sqrt{2})$

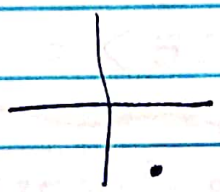
$\frac{36}{20} = (\frac{9}{5}\sqrt{2}, \frac{9}{5}\sqrt{2})$

21. $r^2 = 2^2 + (-3)^2$

$4 + 9$

$r = \pm\sqrt{13}$

$\tan\theta = \frac{-3}{2}$



Radian mode!

$\theta = 5.30$ QIV $(\sqrt{13}, 5.30)$ 1 pt

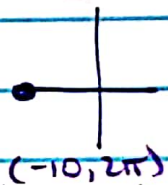
$\theta = 2.16$ QII $(-\sqrt{13}, 2.16)$ 1 pt

22. $r^2 = (-10)^2 + 0^2$

$r^2 = 100$

$r = \pm 10$

$\tan\theta = \frac{0}{-10}$



$\tan\theta = 0$ $(-10, 2\pi)$

$\theta = 0$ $(-10, 0)$

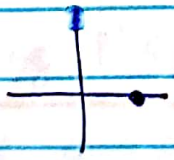
$\theta = \pi$ $(10, \pi)$

23. $r^2 = 5^2 + 0^2$

$r^2 = 25$

$r = \pm 5$

$\tan\theta = \frac{0}{5}$



$\theta = 0$ $(5, 0)$ $(5, 2\pi)$

$\theta = \pi$ $(-5, \pi)$

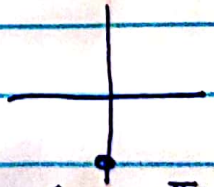
24. $r^2 = 0^2 + (-2)^2$

$r = \pm 2$

$\tan\theta =$ undef.

$\theta = \pi/2$

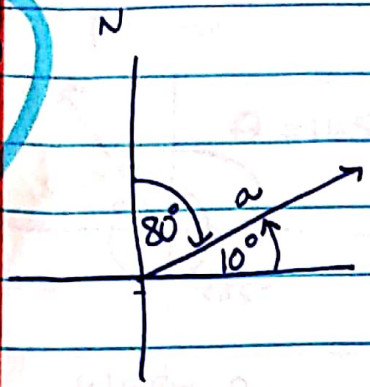
$\theta = 3\pi/2$



$(2, 3\pi/2)$ $(-2, \pi/2)$

review (Back Page)

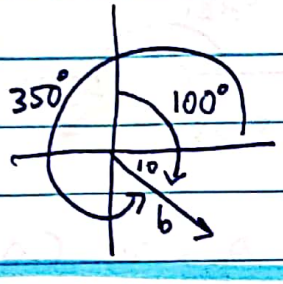
74) 3pts



airplane:

$a = \langle 540\cos 10, 540\sin 10 \rangle$

(a) $\langle 531.796, 93.770 \rangle$



wind:

$b = \langle 55\cos 350, 55\sin 350 \rangle$

$\langle 54.164, -9.551 \rangle$

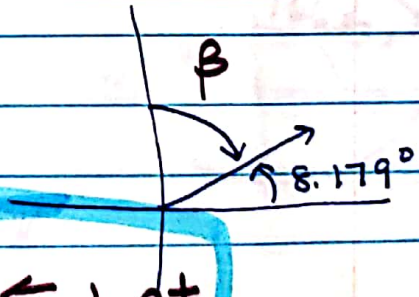
1pt (a) $v = a + b = \langle 585.961, 84.219 \rangle$

(b) $\|v\| = \sqrt{585.961^2 + 84.219^2}$

591.982 mph ← 1pt

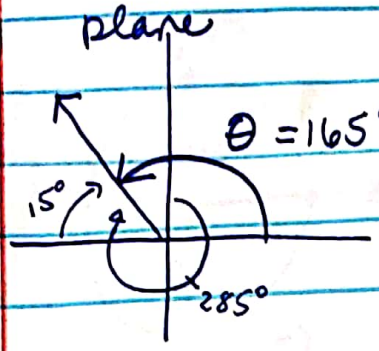
$\theta = \tan^{-1}\left(\frac{84.219}{585.961}\right)$

$\theta = 8.179°$



Bearing N81.821° E ← 1pt

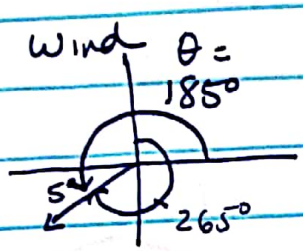
75.



airplane

$a = \langle 480\cos 165, 480\sin 165 \rangle$

(a) $\langle -463.644, 124.233 \rangle$



wind

$b = \langle 30\cos 185, 30\sin 185 \rangle$

$\langle -29.886, -2.615 \rangle$

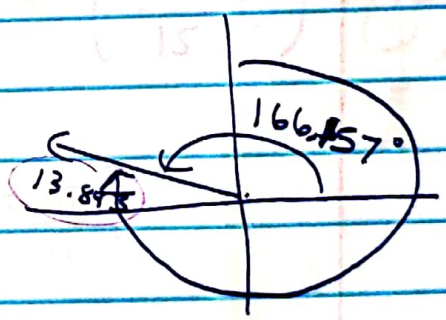
a) $v = a + b$

$= \langle -493.530, 121.618 \rangle$

b) $\|v\| = \sqrt{(-493.530)^2 + (121.618)^2}$

508.294 mph

$\tan\theta = \frac{121.618}{-493.530}$

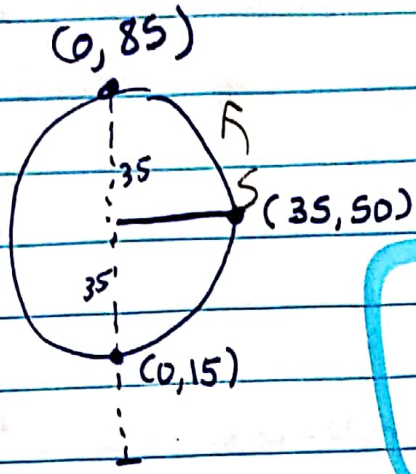


$\theta = -13.843 + 180$

$\theta = 166.157°$ ←

Bearing N 283.843° E *

80)



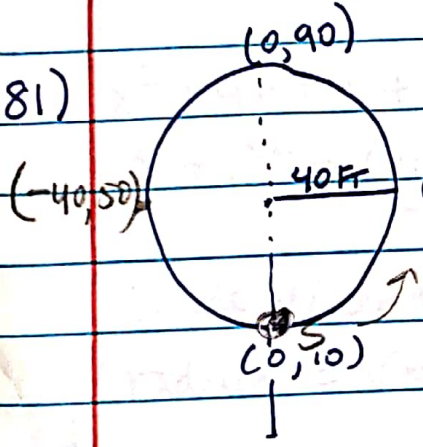
$\theta = \frac{2\pi}{20} t$

2pt

$x = 35\cos\left(\frac{\pi}{10}t\right)$

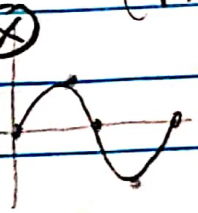
$y = 35\sin\left(\frac{\pi}{10}t\right) + 50$

81)



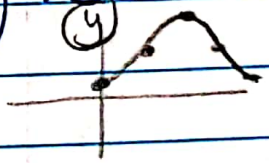
$\theta = \frac{2\pi}{15} t$

tricky start @ lowest pt. (y)

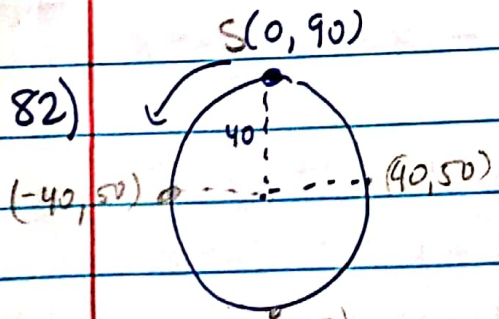


$x = 40 \sin\left(\frac{2\pi}{15}t\right)$

$y = -40 \cos\left(\frac{2\pi}{15}t\right) + 50$



82)

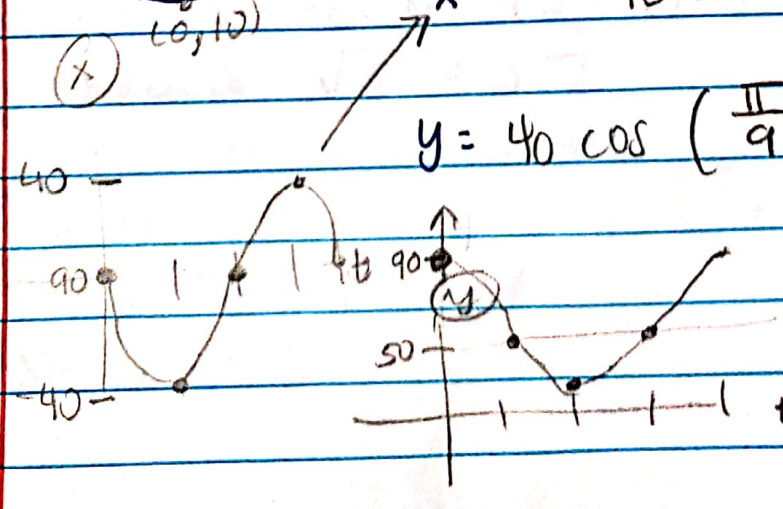


$\theta = \frac{2\pi}{18} t = \frac{\pi}{9} t$

$x = -40\sin\left(\frac{\pi}{9}t\right)$

tricky starting @ highest pt. (y)

$y = 40\cos\left(\frac{\pi}{9}t\right) + 50$



31. $r\sin\theta = 5$

$y = 5$

Horizontal line

2pts

32. $r^2 = 4r\sin\theta$

$x^2 + y^2 = 4y$

$x^2 + y^2 - 4y + 4 = 4$

$x^2 + (y-2)^2 = 4$

circle w/ center $(0, 2)$

radius $= 2$

2pts

41. $r^2 = 2r\sin\theta - 4r\cos\theta$

$x^2 + y^2 = 2y - 4x$

$x^2 + 4x + 4 + y^2 - 2y + 1 = 4 + 1$

$(x+2)^2 + (y-1)^2 = 5$

circle w/ center $(-2, 1)$

radius $= \sqrt{5}$

42. $r^2 = 4r\cos\theta - 4r\sin\theta$

$x^2 + y^2 = 4x - 4y$

$x^2 - 4x + 4 + y^2 + 4y + 4 = +4 + 4$

$(x-2)^2 + (y+2)^2 = 8$

circle w/ center $(2, -2)$

radius $\sqrt{8} = 2\sqrt{2}$

★ $(x-3)(x-3) + (y-2)(y-2) = 13$

$x^2 - 6x + 9 + y^2 - 4y + 4 = 13$

$x^2 + y^2 = 6x + 4y$

$r^2 = 6r\cos\theta + 4r\sin\theta$

$r = 6\cos\theta + 4\sin\theta$ ← 1pt