12/10/12 - Final Exam Review

Math 1060

$$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}}$$

$$\frac{\pi}{2} < u < \pi$$

$$\frac{\frac{\pi}{2}}{2} < \frac{u}{2} < \frac{\pi}{2}$$

$$\pi/4 < \frac{u}{2} < \pi/2$$

Quad I

$$\sin\frac{u}{2} = \sqrt{\frac{1-\frac{-\sqrt{5}}{3}}{2}}$$

$$= \sqrt{\frac{1+\frac{\sqrt{5}}{3}}{2}}$$

$$= \sqrt{\frac{\frac{3+\sqrt{5}}{3}\cdot\frac{1}{2}}{2\cdot\frac{1}{2}}}$$

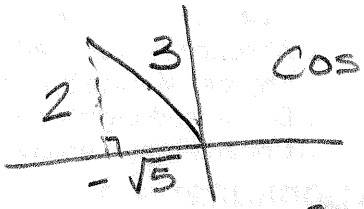
$$= \sqrt{\frac{3+\sqrt{5}}{6}}$$

$$= \frac{\sqrt{3+\sqrt{5}}\cdot\sqrt{6}}{\sqrt{6}\cdot\sqrt{6}}$$

$$= \frac{\sqrt{3\cdot6+6\sqrt{5}}}{\sqrt{36}}$$

$$= \frac{\sqrt{18+6\sqrt{5}}}{6}$$

$\sin u = \frac{2}{3}$ in Quad II



$\cos u = \frac{-\sqrt{5}}{3}$

$a^2 + 2^2 = 3^2$

$a^2 + 4 = 9$

$a^2 = 5$

$a = \sqrt{5}$

#19 $\vec{A} = \langle -3, 2 \rangle$ and $\vec{B} = \langle 1, 4 \rangle$

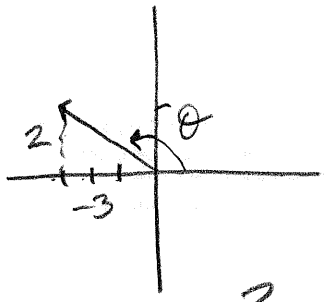
a. $\|\vec{A}\|$ and θ

$\|\vec{A}\|^2 = (-3)^2 + (2)^2$

$\|\vec{A}\| = \sqrt{9+4}$

a) Magnitude $= \sqrt{13}$

angle $\theta = 146.31°$



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

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

$= -33.69°$ Quad IV

$180 - 33.69° = 146.31°$

b) $\vec{A} - \vec{B} = \langle -3-1, 2-4 \rangle$

$\langle -4, -2 \rangle$

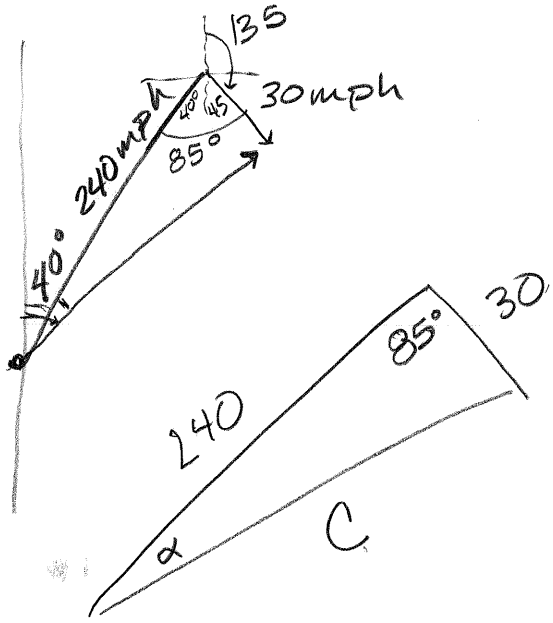
c) $\vec{A} \cdot \vec{B} = (-3)(1) + 2(4)$

$-3 + 8 = 5$

d) angle between $\vec{A}$ & $\vec{B}$

$\cos\alpha = \frac{5}{\sqrt{13} \cdot \sqrt{17}} \Rightarrow \alpha = \cos^{-1}\left(\frac{5}{\sqrt{13} \cdot \sqrt{17}}\right)$

$70.346°$



$$C^2 = 30^2 + 240^2 - 2(30)(240)(\cos 85)$$

$$= 57244.9573$$

$$C = 239.2592 \text{ mph}$$

$$\frac{30 \sin 85}{239.2591844} = \frac{\sin \alpha}{30} \cdot 30$$

$$\alpha = \sin^{-1}\left(\frac{30 \sin 85}{239.2591844}\right)$$

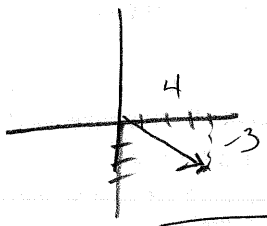
$$\alpha = 7.175552688$$

Bearing: 47.176°

Speed: 239.259 mph

#23 $z_1 = 4 - 3i$ $z_2 = 3 + 3i$

a) $z_1 = 4 - 3i$



$r = \sqrt{4^2 + (-3)^2}$

$= \sqrt{25}$

$= 5$

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

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

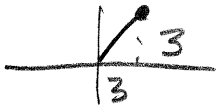
$\theta = -36.8699$

$360 + \nearrow$

323.1301

* $z_1 = 5(\cos 323.1301 + i \sin 323.1301)$

$z_2 = 3 + 3i$



$r = 3\sqrt{2}$ $\tan\theta = \frac{3}{3} = 1$

$\theta = \tan^{-1}(1)$

$= 45°$

* $z_2 = 3\sqrt{2}(\cos 45 + i \sin 45)$

b) $z_1 z_2 = 5 \cdot 3\sqrt{2}\left[\cos(323.1301 + 45) + i \sin(323.1301 + 45)\right]$

$= 15\sqrt{2}(\cos 368.1301 + i \sin 368.1301)$

$= 15\sqrt{2}(\cos 8.1301 + i \sin 8.1301)$

$21 + 3i$

$\frac{z_2}{z_1} = \frac{3\sqrt{2}}{5}\left(\cos(45 - 323.1301) + i \sin(45 - 323.1301)\right)$

$\frac{3\sqrt{2}}{5}(\cos -278.1301 + i \sin -278.1301)$

$$\frac{3\sqrt{2}}{5}(\cos 81.87 + i \sin 81.87)$$

$$\frac{3}{25} + \frac{21}{25}i$$

c) $z_1^4 = 5^4(\cos 4.(323.1301) + i \sin 4(323.1301))$

d) 3rd Roots of $z_2 = 3\sqrt{2}(\cos 45 + i \sin 45)$