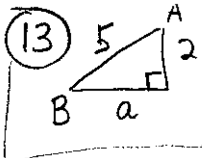
MATH 1065 - Review for Exam 7/8

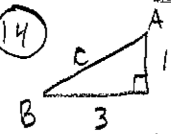
7.R (9) $\cos^2 40^\circ + \cos^2 50^\circ = \cos^2 40^\circ + \sin^2 40^\circ = 1$

(13) 

$a^2 + 2^2 = 5^2 \Rightarrow a = \sqrt{21}$

$\cos A = \frac{2}{5} \Rightarrow A = 66.4^\circ$

$B = 90^\circ - A = 23.6^\circ$

(14) 

$c^2 = 1^2 + 3^2 \Rightarrow c = \sqrt{10}$

$\tan A = \frac{3}{1} \Rightarrow A = 71.6^\circ$

$B = 18.4^\circ$

(24) $a = 10$, $b = 7$, $c = 8$

$a^2 = b^2 + c^2 - 2bc\cos A$

$100 = 49 + 64 - 2(10)7\cos A$

$\cos A = -\frac{13}{140} \Rightarrow A = 95.3^\circ$

$\frac{\sin B}{7} = \frac{\sin 95.3^\circ}{8}$

$B = 60.6^\circ$

$C = 24.1^\circ$

(37) $b = 4$ $c = 10$ $A = 70^\circ$

$A = \frac{1}{2}(4)(10)\sin 70^\circ$

$\boxed{A \approx 18.79}$

(31) $a = 3$, $A = 10^\circ$, $b = 4$

$\frac{\sin B}{4} = \frac{\sin 10^\circ}{3}$

$B_1 = 13.4^\circ$

$C_1 = 156.6^\circ$

$\frac{c_1}{\sin 156.6^\circ} = \frac{3}{\sin 10^\circ} \Rightarrow c_1 = 6.86$

$B_2 = 180^\circ - 13.4^\circ = 166.6^\circ$

$C_2 = 180^\circ - (A + B_2) = 3.4^\circ$

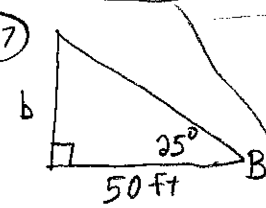
$\frac{c_2}{\sin 3.4^\circ} = \frac{3}{\sin 10^\circ} \Rightarrow c_2 = 1.02$

(41) $a = 4$, $b = 2$, $c = 5$

$s = \frac{4+2+5}{2} = 5.5$

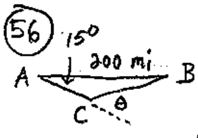
$A = \sqrt{5.5(1.5)(3.5)(.5)}$

$\boxed{A \approx 3.80}$

(47) 

$\tan 25^\circ = \frac{b}{50}$

$\boxed{b = 23.3}$ ft

(56) 

$D = RT$

$b = 18(4) = 72$

a) $a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 200^2 + 72^2 - 2(200)(72)\cos 15^\circ$

$a \approx 131.78$ mi

b) $\frac{\sin B}{200} = \frac{\sin 15^\circ}{131.78}$

$\bar{B} = 23.13^\circ$ $B = 156.87^\circ$

$\theta = 180^\circ - B = 23.13^\circ$

c) $T = \frac{D}{R}$

$T_1 = \frac{200}{18} = 11.\bar{1}$

$T_2 = \frac{72 + 131.78}{18}$

$T_2 \approx 11.321$

$T_2 - T_1 \approx .201$ Hrs or 12.592 Min

8.1 (9) $(2, -\frac{11\pi}{6}) \Rightarrow (2, 30^\circ)$ A (10) $(-2, -\frac{\pi}{6}) \Rightarrow (2, 150^\circ)$ B (11) $(-2, \frac{\pi}{6}) \Rightarrow (2, 210^\circ)$ C

(12) $(2, \frac{7\pi}{6}) \Rightarrow (2, 210^\circ)$ C (13) $(2, \frac{5\pi}{6}) \Rightarrow (2, 150^\circ)$ B (14) $(-2, \frac{5\pi}{6}) \Rightarrow (2, 330^\circ)$ D (15) $(-2, \frac{7\pi}{6}) \Rightarrow (2, 30^\circ)$ A (16) $(2, \frac{11\pi}{6}) \Rightarrow (2, 330^\circ)$ B

8.R (3) $(-2, \frac{4\pi}{3})$

r θ

$x = -2\cos(\frac{4\pi}{3}) = -2(-\frac{1}{2}) = 1$

$y = -2\sin(\frac{4\pi}{3}) = -2(-\frac{\sqrt{3}}{2}) = \sqrt{3}$

$(1, \sqrt{3})$

(12) $(-5, 12)$

x y II

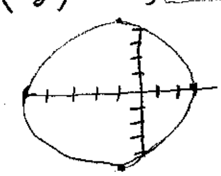
$r^2 = (-5)^2 + (12)^2 = 169 \Rightarrow r = 13$

$\tan\theta = \frac{12}{-5} \Rightarrow \bar{\theta} = 67.38^\circ$ $\theta = 112.62^\circ$

$(13, 112.62^\circ)$

(23) $r = 4 - \cos\theta$

θ	0	90°	180°	270°
r	3	4	5	4



(26) $-\sqrt{3} + i$

$r^2 = (-\sqrt{3})^2 + (1)^2 = 4$

$r = 2$

$\tan\theta = \frac{1}{-\sqrt{3}}$, $\bar{\theta} = 30^\circ$, $\theta = 150^\circ$

$2[\cos 150^\circ + i\sin 150^\circ]$

(37) $z = 3[\cos\frac{9\pi}{5} + i\sin\frac{9\pi}{5}]$ $\theta_1 = 324^\circ$

$w = 2[\cos\frac{\pi}{5} + i\sin\frac{\pi}{5}]$ $\theta_2 = 36^\circ$

$z \cdot w = 3(2)[\cos(324^\circ + 36^\circ) + i\sin(324^\circ + 36^\circ)]$

$= 6[\cos 360^\circ + i\sin 360^\circ]$ or 6

$\frac{z}{w} = \frac{3}{2}[\cos(324^\circ - 36^\circ) + i\sin(324^\circ - 36^\circ)]$

$= \frac{3}{2}[\cos(288^\circ) + i\sin(288^\circ)]$ or $.4635 - 1.4266i$

$\frac{8\pi}{5}$ $\frac{8\pi}{5}$

(43) $[\sqrt{2}(\cos\frac{5\pi}{8} + i\sin\frac{5\pi}{8})]^4$

$z^4 = (\sqrt{2})^4[\cos(4 \cdot \frac{5\pi}{8}) + i\sin(4 \cdot \frac{5\pi}{8})]$

$= 4[\cos(\frac{5\pi}{2}) + i\sin(\frac{5\pi}{2})]$

$= 4[\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}]$

OR $4i$

(50) $z = -16$. Find $\sqrt[4]{z}$

$r = 16$ $\theta = 180^\circ$

$$\sqrt[4]{-16} = 16^{1/4}\left[\cos\begin{pmatrix}45^\circ\\135^\circ\\225^\circ\\315^\circ\end{pmatrix} + i\sin\begin{pmatrix}45^\circ\\135^\circ\\225^\circ\\315^\circ\end{pmatrix}\right]$$

$$= 2\left[\begin{matrix}\sqrt{2}/2\\-\sqrt{2}/2\\-\sqrt{2}/2\\\sqrt{2}/2\end{matrix} + \begin{pmatrix}\sqrt{2}/2\\\sqrt{2}/2\\-\sqrt{2}/2\\-\sqrt{2}/2\end{pmatrix}i\right]$$

$$= \begin{matrix}\sqrt{2} + \sqrt{2}i\\-\sqrt{2} + \sqrt{2}i\\-\sqrt{2} - \sqrt{2}i\\\sqrt{2} - \sqrt{2}i\end{matrix}$$

8.R | 59–68 $\vec{v} = -2\vec{i} + \vec{j}$ $\vec{w} = 4\vec{i} - 3\vec{j}$
$= \langle -2, 1 \rangle$ $= \langle 4, -3 \rangle$

(60) $\vec{v} - \vec{w} = \langle -2-4, 1 - -3 \rangle = \langle -6, 4 \rangle$

(64) $\|\vec{v} + \vec{w}\| = \|\langle 2, -2 \rangle\| = \sqrt{2^2 + (-2)^2} = \sqrt{8} = 2\sqrt{2}$

(68) $-\vec{w} = \langle -4, 3 \rangle \Rightarrow \|-\vec{w}\| = 5 \Rightarrow \vec{u} = -\frac{1}{5}\vec{w} = \langle -\frac{4}{5}, \frac{3}{5} \rangle$

(70) $\|\vec{v}\| = 5$ $\theta = 150°$ $\vec{v} = \langle 5\cos 150°, 5\sin 150° \rangle = \langle -\frac{5\sqrt{3}}{2}, \frac{5}{2} \rangle$

(87) $\vec{v} = \langle -2, 1 \rangle$
$\vec{w} = \langle 4, -3 \rangle$

a) $\vec{v} \cdot \vec{w} = -2(4) + 1(-3) = -8 - 3 = -11$

b) $\cos\theta = \frac{\vec{v} \cdot \vec{w}}{\|v\| \|w\|} = \frac{-11}{\sqrt{5}(5)} \Rightarrow \theta = 169.70°$

(93) $\vec{v} = \langle 4, -1, 2 \rangle$
$\vec{w} = \langle 1, -2, -3 \rangle$

a) $\vec{v} \cdot \vec{w} = 4 + 2 - 6 = 0$

b) $\theta = 90°$

(86) $\vec{v} = \langle 3, 1, -2 \rangle$ $\vec{w} = \langle -3, 2, -1 \rangle$

$\vec{v} \times \vec{w} = \langle 1(-1) - (-2)(2), -2(-3) - 3(-1), 3(2) - 1(-3) \rangle$
$= \langle -1 + 4, 6 + 3, 6 + 3 \rangle$
$= \langle 3, 9, 9 \rangle$

$\|\vec{v} \times \vec{w}\| = \sqrt{9 + 81 + 81} = 3\sqrt{19}$

$\vec{u} = \frac{1}{3\sqrt{19}} \langle 3, 9, 9 \rangle = \langle \frac{1}{\sqrt{19}}, \frac{3}{\sqrt{19}}, \frac{3}{\sqrt{19}} \rangle$

(107) $P_1 = (1,1,1)$ $P_2 = (2,3,4)$ $P_3 = (6,5,2)$

$\overrightarrow{P_1P_2} = \langle 2-1, 3-1, 4-1 \rangle = \langle 1, 2, 3 \rangle$
$\overrightarrow{P_1P_3} = \langle 6-1, 5-1, 2-1 \rangle = \langle 5, 4, 1 \rangle$

$\overrightarrow{P_1P_2} \times \overrightarrow{P_1P_3} = \langle 2(1) - 3(4), 3(5) - 1(1), 1(4) - 2(5) \rangle = \langle -10, 14, -6 \rangle$

$A_{\square} = \|\overrightarrow{P_1P_2} \times \overrightarrow{P_1P_3}\| = \sqrt{100 + 196 + 36} = \sqrt{332} = 2\sqrt{83} \approx 18.22$