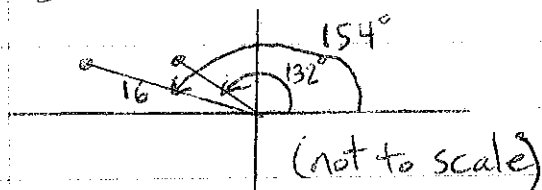


(10) ① Solve for the missing parts of this triangle (assuming A is acute, i.e. less than 90°).

$$a = 17, b = 13, B = 17^\circ$$

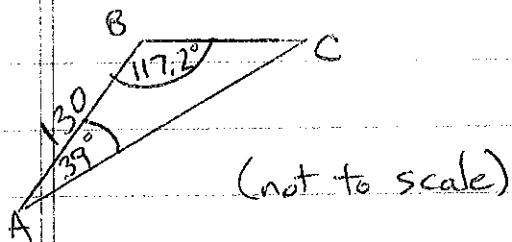
(10) ② A boat left a port going 12 miles at an angle of 132° to the positive part of the x axis. Another left the same port going 16 miles at an angle of 154° . How far apart are they?



(10) ③ If $a = 71.5$, $b = 60.3$,

$$c = 88.2, \text{ find } A, B, \text{ and } C.$$

(10) ④ To measure the length BC of a lake, a baseline AB is established and measured to be 130 meters. Angles A and B are measured as 39° and 117.2° respectively. How long is the lake?



(10) ⑤ a) Convert $(4, 300^\circ)$ to rectangular form. (exact values)

b) Convert $(-2.08, -1.34)$ to polar form with $r > 0, 0^\circ \leq \theta < 360^\circ$. Show work.

(10) ⑥ a) Change the equation $r = 6 \sin \theta$ to rectangular form. Show work.

b) Change $x^2 + 16y^2 = 16$ to polar form.

(20) ⑦ Sketch the following:

a) $r = 3 \sin \theta$

b) $r^2 = 16 \sin 2\theta$

c) $r = 2 \cos 3\theta$

d) $r \cos \theta = 4$

(20) ⑧ a) Let $\vec{v} = 2\vec{i} - 3\vec{j}$, $\vec{w} = 3\vec{i} + 4\vec{j}$. Find $2\vec{w} - 4\vec{v}$.

b) Find $\|\vec{v}\|$ if $\vec{v} = 2\vec{i} - 3\vec{j}$.

c) If $A = (-2, 1)$ and $B = (3, 4)$ represent \vec{AB} in the form $x\vec{i} + y\vec{j}$.

d) If $\|\vec{v}\| = 3$, write the vector \vec{v} in the form $x\vec{i} + y\vec{j}$ if the angle it makes with the positive x axis is 330° . Give exact values.

MAC 1114 EXAM III KEY (F'11)

① $\frac{\sin A}{17} = \frac{\sin 17^\circ}{13} \Rightarrow A = 22.5^\circ$
 $C = 180^\circ - 17^\circ - 22.5^\circ = 140.5^\circ$

$$\frac{c}{\sin 140.5^\circ} = \frac{13}{\sin 17^\circ}$$

$$c \approx 28.3$$

② $154^\circ - 132^\circ = 22^\circ$

$$c^2 = 16^2 + 12^2 - 2(16)(12)\cos 22^\circ$$

$$c \approx 6.63$$

③ $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$ etc.

$A = 53.7^\circ, B = 42.8^\circ, C = 83.5^\circ$

④ Want $x = BC = \text{length of lake}$
 $C = 180^\circ - 39^\circ - 117.2^\circ = 23.8^\circ$

$$\frac{x}{\sin 39^\circ} = \frac{130}{\sin 23.8^\circ}$$

$$\Rightarrow x \approx 202.7$$

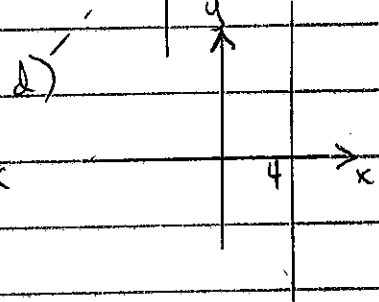
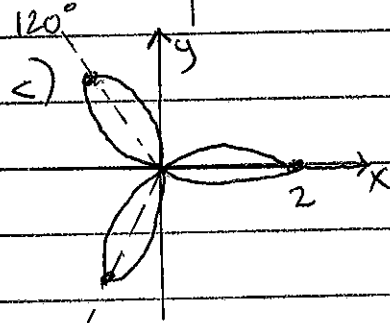
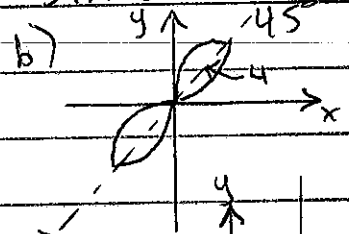
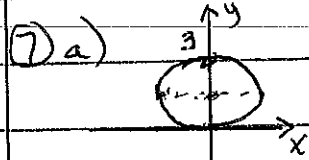
⑤ a) $x = 4 \cos 300^\circ = 4(\frac{1}{2}) = 2$
 $y = 4 \sin 300^\circ = 4(-\frac{\sqrt{3}}{2}) = -2\sqrt{3}$
 $(2, -2\sqrt{3})$

b) $r = \sqrt{2.08^2 + 1.34^2} \approx 2.47$
 $\tan \alpha = \frac{1.34}{2.08} \Rightarrow \alpha \approx 32.8^\circ$

$\theta = 180^\circ + 32.8^\circ = 212.8^\circ$
 $(2.47, 212.8^\circ)$

⑥ a) $r^2 = 6r \sin \theta$
 $x^2 + y^2 = 6y$

b) $r^2 \cos^2 \theta + 16r \sin^2 \theta = 16$



⑧ a) $2(3i + 4j) - 4(2i - 3j)$
 $= 6i + 8j - 8i + 12j$
 $= -2i + 20j$

b) $\|\vec{v}\| = \sqrt{4 + 9} = \sqrt{13}$

c) $(3 - (-2))i + (4 - 1)j$
 $= 5i + 3j$

d) $\|\vec{v}\|(\cos 330^\circ i + \sin 330^\circ j)$
 $= 3(\frac{\sqrt{3}}{2}i - \frac{1}{2}j)$
 $= \frac{3\sqrt{3}}{2}i - \frac{3}{2}j$