

(MWF, 60 pts)

MAC 1114

EXAM IV

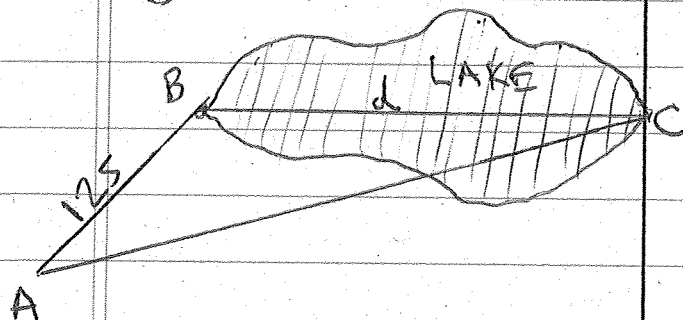
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SPRING 2016

(10) ① Find  $B, C, c$  if  
 $A = 123^\circ, b = 23, a = 47$  in  
 $\triangle ABC$ .

(10) ② If  $A = 112.2^\circ, b = 7.46,$   
 $c = 14.3$ , find  $a$  and  $B$  in  
 $\triangle ABC$ .

(10) ③



To measure the length  $d$ , of  
a lake, a baseline  $AB$  is  
established to be 125  
meters.

Angles  $A$  and  $B$  are  
measured as  $41.6^\circ$  and  
 $124.3^\circ$  respectively.

How long is the lake?

(15) ④ a) Convert  $(7, 150^\circ)$   
to rectangular form. Give  
exact values. Show work.

b) Convert  $(-2, 13, -4, 61)$   
to polar form, with  $r \geq 0$   
and  $0^\circ \leq \theta \leq 360^\circ$ . Show  
all work.

c) Convert the equation  
 $x^2 + y^2 - 6x = 0$  to  
polar form.

(15) ⑤ Sketch the following  
including key values and  
angles:

a)  $r = 3 + 3 \cos \theta$

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

c)  $\theta = \frac{2\pi}{3}$

MAC 1114 EXAM IV KEY (SP'16)

$$\textcircled{1} \frac{\sin B}{23} = \frac{\sin 123^\circ}{47}$$

$$\Rightarrow B = 24.2^\circ$$

$$C = 180^\circ - 123^\circ - 24.2^\circ$$

$$= 32.8^\circ$$

$$\frac{c}{\sin 32.8^\circ} = \frac{47}{\sin 123^\circ}$$

$$c = 30.36$$

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

$$= 7.46^2 + 14.3^2 - 2(7.46)(14.3) \cos 112.2^\circ$$

$$\Rightarrow a = 18.46$$

$$\frac{\sin B}{7.46} = \frac{\sin 112.2^\circ}{18.46}$$

$$\Rightarrow B \approx 21.9^\circ$$

(could use LOC to find B)

$$\textcircled{3} C = 180^\circ - 41.6^\circ - 124.3^\circ$$

$$= 14.1^\circ$$

$$\frac{d}{\sin 41.6^\circ} = \frac{125}{\sin 14.1^\circ}$$

$$d \approx 341 \text{ meters}$$

$$\textcircled{4} \text{a) } x = r \cos \theta$$

$$= 7 \cos 150^\circ$$

$$= 7 \left( -\frac{\sqrt{3}}{2} \right) = -\frac{7\sqrt{3}}{2}$$

$$y = r \sin \theta$$

$$= 7 \sin 150^\circ$$

$$= 7 \left( \frac{1}{2} \right) = \frac{7}{2}$$

$$\left( -\frac{7\sqrt{3}}{2}, \frac{7}{2} \right)$$

$$\textcircled{4} \text{b) } r = \sqrt{2.13^2 + 4.61^2} \approx 5.078$$

$$\tan \alpha = \frac{4.61}{2.13}$$

$$\alpha \approx 65.2^\circ$$

$$\theta = 180^\circ + 65.2^\circ = 245.2^\circ$$

(since pt. is in Q III)

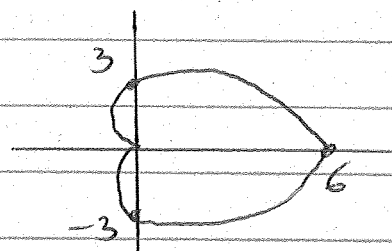
$$(5.078, 245.2^\circ)$$

$$\text{c) } r^2 - 6r \cos \theta = 0$$

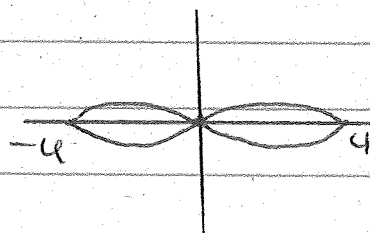
$$\text{OR } r^2 = 6r \cos \theta$$

$$\text{OR } r = 6 \cos \theta$$

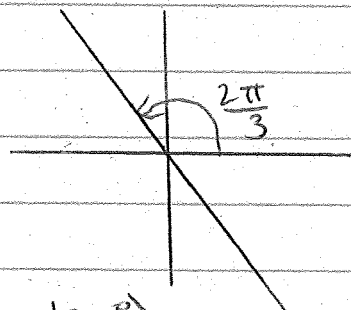
\textcircled{5} a)



b)



c)



$$\left( \frac{2\pi}{3} = 120^\circ \right)$$