

# DEPARTMENT OF MATHEMATICS

Ma 110 Third Exam November 21, 2008

**DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.**

**Instructions:** Be sure your name, section number, and student ID are filled in below. Cell phones must be OFF and put away before you open this exam. You may use calculators (including graphing calculators, but no laptops or cellphone calculators) for checking numerical calculations. However, you must show your work to receive credit.

Put your answers in the answer boxes provided, and show your work.

**If your answer is not in the assigned space or if you have no work to support your answer, you will receive no credit.**

The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided during the exam.

Problem	Maximum Score	Actual Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
Homework	10	
Total	100	

Please fill in the information below.

NAME: \_\_\_\_\_ Section: \_\_\_\_\_

Last four digits of Student ID: \_\_\_\_\_

1. The points  $(1, -4)$ ,  $(2, -13)$  and  $(-1, 2)$  are on the graph of the quadratic function  $f(x) = ax^2 - 3x + c$ .

From this we can conclude that:

$$a = \underline{\hspace{2cm}} \quad c = \underline{\hspace{2cm}}$$

2.  $P(A)$ , the locator point of an angle  $A$  is known to be  $(0.7660, 0.6428)$

Also,  $P(B)$ , the locator point of an angle  $B$  is known to be  $(0.6427, 0.7661)$

Using appropriate trigonometric identities, calculate the locator points for the following angles. It is enough to do any two of the following four problems. You must precisely state the appropriate identities used and show work indicating how they are used.

NOTE: You do not need to simplify your answers.

**If you do more than two problems, we will only grade the first two, even though some later ones might be correct. Be sure to scratch out any work that should not be graded.**

- (a) The locator point  $P(A + B)$  is:

( \_\_\_\_\_, \_\_\_\_\_ )

Used Identities and calculations:

- (b) The locator point  $P(A - B)$  is:

( \_\_\_\_\_, \_\_\_\_\_ )

Used Identities and calculations:

- (c) The locator point  $P(2A)$  is:

( \_\_\_\_\_, \_\_\_\_\_ )

Used Identities and calculations:

- (d) The locator point  $\frac{B}{2}$  is:

( \_\_\_\_\_, \_\_\_\_\_ )

Used Identities and calculations:

3. The function  $f(x) = ax^2 + bx + c$  has roots  $-4$  and  $-1$  and its graph meets the  $y$ -axis at  $(0, -12)$ .

Does the graph of  $y = f(x)$  open up or down? Justify your answer.

The extremum point of the graph is the point  
 $x = \underline{\hspace{2cm}}$  and  $y = \underline{\hspace{2cm}}$

Is this the highest or the lowest point on the graph? Justify your answer.

4. Let  $C$  be the circle given by the equation  $x^2 + 2x + 6 + y^2 - 6y = 0$

Then the center and the radius of  $C$  are:

$$\text{Center} = (\text{-----}, \text{-----})$$

$$\text{Radius} = \text{-----}$$

Determine whether the point  $A(-3, 2)$  is inside or outside of  $C$ .

$$\text{ANSWER} = \text{-----}$$

Explain your answer.

5. If  $L$  is the line given by the equation  $y = 3 - 2x$  then:

(a) Are the points  $A(-5, 9)$  and  $B(1, 5)$  on the same side of  $L$  or the opposite side of  $L$ ? Justify your answer.

(b) Are the points  $C(4, -9)$  and  $D(5, -11)$  on the same side of  $L$  or the opposite side of  $L$ ? Justify your answer.

6. If  $A = (4, 5)$  and  $B = (-4, -4)$ , then the equation of the circle which has the line segment  $AB$  as a diameter is

$$\underline{\hspace{10em}} = 0$$

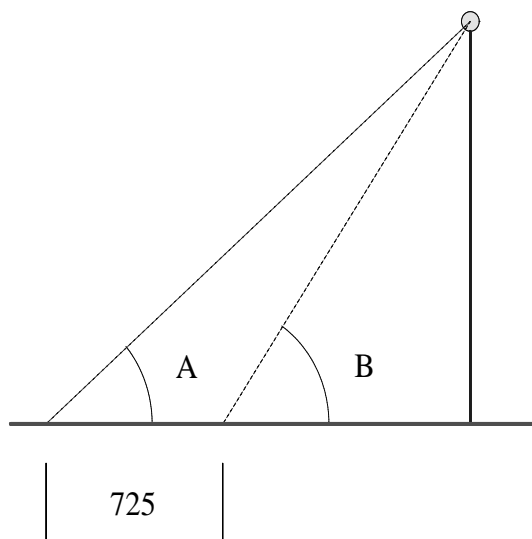
7. (a) The distance from the point  $(5, -1)$  to the line  $L$  given by the equation  $-5x - 5y + 2 = 0$  is:

*ANSWER*: \_\_\_\_\_

- (b) The equation of the circle centered at  $(5, -1)$  and tangent to the line  $L$  is:

*ANSWER*: \_\_\_\_\_

8.



At an unknown distance from its base, the top of a tower subtends an angle  $\angle B$  which measures 40.900 degrees.

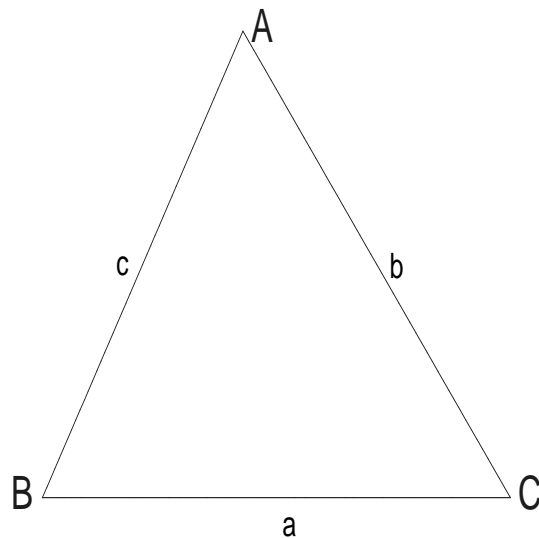
From a distance of 725 feet further away, the top of the same tower subtends an angle  $\angle A$  which measures 31.880 degrees.

To within five feet the tower is

\_\_\_\_\_

feet high.

9.



The triangle above shows the usual naming conventions used in the problem below. There is no relation with the size or the shape of the given triangles.

(a) A triangle has vertices at  $A(-8, 6)$  and  $B(3, 9)$ . The angle  $\angle CAB$  measures 42 degrees and the angle  $\angle CBA$  measures 68 degrees. Then the length of the line segment  $AC$  is:

$$b = \underline{\hspace{2cm}}$$

and the length of the line  $BC$  is:

$$a = \underline{\hspace{2cm}}$$

(b) A triangle has vertices  $A(-10, 8)$ ,  $B(4, 9)$ , and  $C(-3, 6)$ . Then the angle  $\angle BAC$  measures:

$$\angle A \underline{\hspace{2cm}}$$

degrees.

## 1 Answer Key for ex3f08\_v1

1.  $\diamond$   $a = -2$   $c = 1$
2.  $\diamond$  (a)  $[0.0, 1.0]$  (b)  $[0.9848, -0.1737]$  (c)  $[0.1739, 0.9848]$  (d)  $[0.9063, 0.4227]$
3.  $\diamond$  Opens down High/low? highest  $x = -5/2$   $y = \frac{27}{4}$
4.  $\diamond$  Center  $[-1, 3]$  Radius 2 ANSWER= outside
5.  $\diamond$  (a) are not (b) are
6.  $\diamond$  Equation:  $(x - 4)(x + 4) + (y - 5)(y + 4) = 0$
7.  $\diamond$  (a)  $9/5\sqrt{2}$  (b)  $(x - 5)^2 + (y + 1)^2 - \frac{162}{25}$
8.  $\diamond$  height: 1599 feet.
9.  $\diamond$  (a)  $\frac{\sqrt{130}\sin(\frac{17}{45}\pi)}{\sin(\frac{7}{18}\pi)} = 11.251$   $\frac{\sqrt{130}\sin(\frac{7}{30}\pi)}{\sin(\frac{7}{18}\pi)} = 8.1190$  (b) 20.031015