

# Math 1151 Sample Final Exam

Name:

I.D.

Section No.

April 30, 2007

Please note there are two parts. No calculator, notes, or books are allowed in this exam. The total scores of this exam is 200 points. Part I is worth 140 points. Part II is worth 60 points. Write carefully your work on each question for full credits. You will get no points if you write only the final answers.

In Part A, solve ALL problems from No.1 through No.7.

In Part B, you may solve as many as you like from No.8 through No.14. However, only 3 problems of them will be graded. MARK the ones that you would like to be graded.

You may use the following list of formula.

(1)  $\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta.$

(2)  $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta.$

(3)  $\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}.$

Part A	Points
# 01.(20pts.)	
# 02.(20pts.)	
# 03.(20pts.)	
# 04.(20pts.)	
# 05.(20pts.)	
# 06.(20pts.)	
# 07.(20pts.)	
subtotal	

Part B	Points
# 08.(20pts.)	
# 09.(20pts.)	
# 10.(20pts.)	
# 11.(20pts.)	
# 12.(20pts.)	
# 13.(20pts.)	
# 14.(20pts.)	
subtotal	

**Part I:** There are 7 questions. Show all problems.

1. (20 points) Find the exact value of the following.

$$\sin\left(\cos^{-1}\frac{1}{2} + \sin^{-1}\frac{3}{5}\right).$$

2. (20 points) Let

$$\cos\theta = \frac{3}{5}, \quad 0 < \theta < \pi.$$

Then calculate the exact values of  $\cos\theta$  and  $\tan\theta$ .

3. (20 points) Find the amplitude, period, and phase shift of

$$y = 2 \cos(4x + 3\pi),$$

and sketch the function.

4. (20 points) Establish the following identity.

$$\frac{1 + \tan \theta}{1 + \cot \theta} = \tan \theta.$$

5. (20 points) Find all solutions of the following equation on the interval  $0 \leq \theta < 2\pi$ .

$$\cos(2\theta) + 3 = 5 \cos \theta.$$

6. (20 points) Transform

$$-x^2 + 4y^2 - 2x - 16y + 11 = 0$$

into the standard form. Find the coordinates of the center, foci, and vertices, and sketch the graph.

7. (20 points) Find all complex zeros of

$$f(x) = 2x^3 + 11x^2 - 7x - 6.$$

Write  $f(x)$  in factored form.

**Part II:** There are 7 questions. You may solve as many as you like. However, **only 3 problems** of them will be graded. Mark the ones that you would like to be graded.

8. (20 points) Solve the following triangle and sketch it.

$$\alpha = 45^\circ, \beta = 75^\circ, c = 7$$

9. (20 points) Find all complex zeros of the polynomial equation:

$$3x^4 + 5x^3 + 25x^2 + 45x - 18 = 0.$$

10. (20 points) Write the complex number  $(1 + i)^5$  in the standard form  $(a + bi)$ .

11. (20 points) Sketch the graph of

$$4x^2 + y^2 - 8x + 4y + 4 = 0$$

and find the vertex, focus, and the directrix .

12. (20 points) Solve the system of the equation:

$$\begin{cases} 2x - 3y = 1 \\ -x + y = -3 \end{cases}$$

13. (20 points) Let

$$\cos \alpha = \frac{1}{2}, \quad -\frac{\pi}{2} < \alpha < 0; \quad \sin \beta = \frac{1}{3}, \quad 0 < \beta < \frac{\pi}{2}.$$

Find the exact value of  $\cos(\alpha + \beta)$ .

14. (20 points) Graph the following system of inequalities.

$$\begin{cases} x^2 - y \leq 4 \\ x + y \leq 2 \end{cases}$$