

# MATH 1220-90 Fall 2011

## Final Exam

INSTRUCTOR: H.-PING HUANG

**Hint: do NOT calculate any numerical value, unless specified otherwise.**

LAST NAME \_\_\_\_\_

FIRST NAME \_\_\_\_\_

ID NO. \_\_\_\_\_

**INSTRUCTION:** SHOW ALL OF YOUR WORK. MAKE SURE YOUR ANSWERS ARE CLEAR AND LEGIBLE. USE **SPECIFIED** METHOD TO SOLVE THE QUESTION. IT IS NOT NECESSARY TO SIMPLIFY YOUR FINAL ANSWERS.

PROBLEM 1 30 \_\_\_\_\_

PROBLEM 2 30 \_\_\_\_\_

PROBLEM 3 30 \_\_\_\_\_

PROBLEM 4 30 \_\_\_\_\_

PROBLEM 5 30 \_\_\_\_\_

PROBLEM 6 20 \_\_\_\_\_

PROBLEM 7 20 \_\_\_\_\_

PROBLEM 8 30 \_\_\_\_\_

TOTAL 160 \_\_\_\_\_

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## PROBLEM 1

(30 pt) Let  $f(x) = 2 + 3x + 5e^x$ . Find  $(f^{-1})'(7)$ .

## PROBLEM 2

(30 pt) Use integration by parts to evaluate the integral.

$$\int x e^{2x} dx$$

## PROBLEM 3

(30 pt) Let

$$F(x) = \int_0^x \sin(7t^2) dt.$$

Find the Taylor polynomial of degree 3 for  $F(x)$  at  $x = 0$ .

## PROBLEM 4

(30 pt) Find the slope of the tangent to the curve  $r = 9 + 2 \cos \theta$  at the value  $\theta = \pi/2$ .

## PROBLEM 5

(20 pt) Find the area inside the inner loop of the following limaçon:  
 $r = 1 - 2 \sin \theta$ .

## PROBLEM 6

(20 pt) Solve the following differential equation:

$$y'' + 9y = 0; \quad y = 3, \text{ and } y' = 3 \text{ at } x = \frac{\pi}{3}.$$

## PROBLEM 7

(30 pt) Solve the following differential equation:

$$y'' - 3y' - 10y = 0; \quad y = 1, \text{ and } y' = 10 \text{ at } x = 0.$$



## PROBLEM 8

(30 pt) Determine the distance between the vertices of

$$-9x^2 + 18x + 4y^2 + 24y - 9 = 0.$$