## MATH 4200-1 FALL 2008 First Mock Exam

INSTRUCTOR: H.-PING HUANG

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 25 \_\_\_\_\_
- PROBLEM 2 25 \_\_\_\_\_
- PROBLEM 3 25 \_\_\_\_\_
- PROBLEM 4 25 \_\_\_\_\_

TOTAL 100 \_\_\_\_\_

(25 pt) Graph the set of points  $z \in \mathbb{C}$  which satisfy the equation  $z^2 + \overline{z}^2 = 2$ . Hint: If z = x + iy, rewrite this equation as an equation in x and y.

(10 pt) For which values of z does the series  $\sum_{n=0}^{\infty} 1/(n^2+z^2)$  converges?

(15 pt) Find the radius of convergence of the power series  $\sum_{n=0}^{\infty} nz^n$ .

(25 pt) Analyze the function  $\sqrt{z}$  defined by

 $\sqrt{z} = e^{(1/2)\log z}$ 

using the principal branch of the log function. What kind of a jump, if any, does it have as z crosses the negative real axis?

(25 pt) What is the largest set (of  $\mathbb{C}$ ) on which the function  $f(z) = 1/(1-e^z)$  is continuous?