MATH 3220-1 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	______

PROBLEM 1

(25 pt) State the Cauchy-Schwarz Inequality. Use that to prove the Triangle Inequality.

PROBLEM 2

(25 pt) Prove that every convergent sequence in $\mathbb{R}^d$ is bounded.

PROBLEM 3

(25 pt) For each of the following sets, sketch E^o, $\overline{E}$, and ∂E.

$$(a) E = \{(x, y) : x^2 + 4y^2 \leq 1\}$$
$$(b) E = \{(x, y) : x^2 - 2x + y^2 = 0\} \cup \{(x, 0) : x \in [2, 3]\}$$
$$(c) E = \{(x, y) : y \geq x^2, \quad 0 \leq y < 1\}$$
$$(d) E = \{(x, y) : x^2 - y^2 < 1, \quad -1 < y < 1\}$$

PROBLEM 4

(25 pt) Prove that if K is a compact subset of $\mathbb{R}^d$, then K contains points of minimal norm and points of maximal norm. That is, there are points $x_0, x_1 \in K$ such that

$$\|x_0\| \leq \|x\| \leq \|x_1\| \quad \forall x \in K$$