Quiz 6, Math 441
Due Wed. Oct. 27, No late quiz will be accepted

Name $- - - - - - - - - - - - - - - - - - (Last) - - - - - - - - - - - - - - - (First)$

Problem 1 (6pts). (a) Let the closure of a set V be $cl(V)$. Show that $cl(A \cap B) \subset cl(A) \cap cl(B)$.

(b) Show that every order topology is Hausdorff.

(c) Show that X is Hausdorff if and only if the diagonal $D = \{(x, x) | x \in X\}$ is closed in $X \times X$.

Problem. 2 (4pts). Find all limit points and interior of the following subsets of $\mathbf{R}^2$ with the standard topology. Justify your assertions.

(a) $A = \mathbf{R} \times \{0\}$
(b) $B = \{(x, y) | 1 < x^2 + y^2 \leq 2\}$
(c) $C = B - A$
(d) $D = \{(x, y) || xy| \geq 1\}$.

Problem 3.(5pts) Suppose f and g are two continous maps from $X \to \mathbf{R}$ where $\mathbf{R}$ has the standard topology. Show that the set $\{x \in X | f(x) \leq g(x)\}$ is closed. (hint: consider the map (f,g): $X \to \mathbf{R}^2$).

Problem 4 (5pts). If $f : Z \to Y$ is a map so that for any subset $B \subset Z$, $f(\bar{B}) \subset \bar{(}f(B))$, show that f is continuous.