

Quiz 3, Math 441

Due Wed. Sept. 29, No late quiz will be accepted

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

Problem 1 (6pts). Show that $d((x, y), (a, b)) = \max(|x-a|, |y-b|)$ on R^2 defines a distance. Find the open ball of radius r about the origin. Show that the topology defined by this distance is the same as the standard topology.

Problem. 2 (3pts). Let $X = (0, 1) \cup (2, 3)$ be the subset of R^1 having the subspace topology. Find all subsets of X which are both open and closed in X .

Problem 3.(6pts) Determine which of the following sets are open in R^2 in the standard topology. Justify your assertions.

(a) $A = \{(x, y) | x > y^2\}$

(b) The set of all points of distance less than 2 to the square $\{(x, y) | |x| \leq 1, |y| \leq 1\}$.

(c) The set of all points (x, y) so that $\sin(xy) \leq 0$.

Problem 4 (5pts). If (X, d) is a metric space, prove that $d : X \times X \rightarrow \mathbb{R}$ is continuous, where $X \times X$ has the product metric.