

Homework

M472

Fall 2012

1. TRUE OR FALSE:

- (a) A subset consisting of a single point in a metric space is either open or closed.
- (b) A subset of a metric space can be both open and closed.

2. Recall the definition of the taxicab metric on the plane:

$$d_{max}((x_1, x_2), (y_1, y_2)) = |y_1 - x_1| + |y_2 - x_2|$$

Considering the plane a metric space with this metric, draw an open ball of radius 1 centered at $(0, 0)$.

3. Prove that a subset of the plane is open in the topology induced by the taxi cab metric if and only if it is open in the topology induced by the euclidean metric.