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**Quiz 2 - Topology – Fall 2015**

1. (9 pts) Define each of the following notions:

(a) A topological space  $(X, \mathcal{T})$  is *sequentially compact* if

(b) A topological space  $(X, \mathcal{T})$  is *limit point compact* if

(c) If  $(X, d)$  is a metric space and  $\mathcal{A}$  is an open cover of  $X$ , a number  $\delta > 0$  is called a *Lebesgue number for the cover  $\mathcal{A}$*  if

2. (6 pts) True or False? Answer and give a brief justification in each case.

(a) The set  $E = \{(x, y) \mid x^2 + 9y^2 = 9\}$  is compact in  $\mathbb{R}^2$ .

(b) The set  $H = \{(x, y) \mid x^2 - 9y^2 = 9\}$  is compact in  $\mathbb{R}^2$ .

**3.** (7 pts) Choose ONE to prove:

- (a) If  $X$  is a compact topological space and  $Y$  is a closed subset of  $X$  then  $Y$  is compact.
- (b) If  $f : X \rightarrow Y$  is continuous and  $X$  is compact then  $f(X)$  is compact.