MTG 5316/4302 ASSIGNMENT 9

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These problems are due on November 12, 2014. You may discuss the problems with members of the class and with me. You may consult our textbook and other books. You may not read the papers of other students. The final writeup must be done by yourself in your own words. It must not be copied from any sources.

Problem 1. Let A be obtained from the interval $[0,1]$ by identifying 0 and 1. We denote this $[0,1]/0 \sim 1$. Show that A with the quotient topology is homeomorphic to the circle S^1.

Problem 2. Let $q : \mathbb{R} \to \mathbb{R}/\mathbb{Z}$ be the quotient group homomorphism. Show that if $\mathbb{R}/\mathbb{Z}$ is given the quotient topology from q, then it is homeomorphic to S^1.

Problem 3. Let M be the following matrix.

$$M = \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$$

Show that $f_M : \mathbb{R}^2/\mathbb{Z}^2 = \mathbb{T}^2 \to \mathbb{T}^2$ is a homeomorphism.