MTG 5316/4302 FALL 2018 ASSIGNMENT 10

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These problems are due in class on Friday, November 16, 2018.

You may discuss the problems with members of the class and with me. You may consult the 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 source. In this assignment each problem is worth 2 points for a total of 10 points.

Problem 1. Let X be a topological space. Define the **cone** of X, $c(X)$.

Problem 2. Show that if $X = \mathbb{N}$ with the discrete topology, then $c(\mathbb{N})$ is not metrizable.

Problem 3. Let X be a topological space and $f : X \to Y$ be a continuous function. Define the **mapping cylinder** of f denoted by M_f. Suppose that $Y = D^2$ is a disk and $f : \mathbb{S}^1 \to D^2$ is the constant function mapping $\mathbb{S}^1$ to the center point of the disk. Give a picture of the mapping cylinder.

Problem 4. Let X be a topological space. Define the **mapping torus** of X denoted by T_f. Let $X = \mathbb{S}^1$ and $f = id : \mathbb{S}^1 \to \mathbb{S}^1$. What is T_f in this case?

Problem 5. Suppose that $f : \mathbb{S}^1 \to \mathbb{S}^1$ is rotation by π. What is the mapping torus, T_f, in this case? What if f is rotation by $a \cdot \pi$ where a is an irrational number?