

MTG 5316/4302 FALL 2018 ASSIGNMENT 1

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These problems are due in class on Friday, August 31, 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.

Problem 1 Define open set in a metric space X . Define what it means for a set $A \subset X$ to be connected in a metric space X .

Problem 2 Show that if a set $A \subset \mathbb{R}$ is connected, then it must be an interval.

Problem 3 Define what it means for a function $f : X \rightarrow Y$ to be continuous for X and Y metric spaces.

Problem 4 Suppose that $f : X \rightarrow Y$ is continuous with X and Y metric spaces. Show that if $A \subset X$ is connected, then $f(A) \subset Y$ is connected.

Problem 5 Show that if $A \subset \mathbb{R}$ is an interval, then it is connected.