Math 525: Problem Set 1

Due date: In class on Wednesday, September 2.
Course Web Page: `http://dunfield.info/525`
Office hours: Mondays from 11-12, Tuesdays from 11:30 - 12:30, and by appointment. For an appointment, just talk to me after class, or email me at `nmd@illinois.edu`.
Required Text: Allen Hatcher, *Algebraic Topology*,
`http://www.math.cornell.edu/~hatcher/AT/ATpage.html`

1. Suppose X and Y are topological spaces. Let A and B be closed subsets of X with $A \cup B = X$. If $f_A \colon A \to Y$ and $f_B \colon B \to Y$ are continuous functions which agree on $A \cap B$ prove that the function $f \colon X \to Y$ given by

$$f(x) = \begin{cases} f_A(x) & \text{if } x \in A. \\ f_B(x) & \text{if } x \in B. \end{cases}$$

   is continuous.

2. Hatcher, Section 1.1, Problem 2.

3. Hatcher, Section 1.1, Problem 3.

4. Hatcher, Section 1.1, Problem 5.