MATH 634 HOMEWORK

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Abstract. Due Wednesday, October 20. de Rham cohomology computations.

MT 6.3. Let $p_1, \ldots, p_r \in \mathbb{R}^n$ be distinct points and $n > 1$. Compute the cohomology of $U = \mathbb{R}^n - \{p_1, \ldots, p_r\}$.

MT 5.3 Do there exist open, connected $U, V \in \mathbb{R}^2$ such that $\mathbb{R}^2 = U \cup V$ and $U \cap V$ is disconnected?

MT 5.4, Phragmen–Brouwer property of $\mathbb{R}^n$. Suppose $p \neq q \in \mathbb{R}^n$. A closed set $A \subset \mathbb{R}^n$ is said to *separate* p from q if p and q lie in different connected components of $\mathbb{R}^n - A$. Let $A, B \subset \mathbb{R}^n$ be closed and disjoint and fix $p \neq q \in \mathbb{R}^n - (A \cup B)$. Show that if neither A nor B separates p from q, then neither does $A \cup B$. (Hint: Mayer-Vietoris with $U = \mathbb{R}^n - A$ and $V = \mathbb{R}^n - B$.)

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Date: October 13, 2010.