

**Third Homework Assignment in 18.101**  
**(Due Monday, October 20)**

(1) Munkres §13 #1, part b and #2. (You'll need part b of exercise 1 to do exercise 2.)

(2) Munkres §14, #8.

(3) Munkres §16, #3.

(4) Let  $U$  be an open subset in  $\mathbb{R}^n$  and  $A \subseteq U$  a compact subset. Prove

**Theorem.** *There exists a  $C^\infty$  function,  $p : \mathbb{R}^n \rightarrow \mathbb{R}$  such that  $p$  is equal to one on a neighborhood of  $A$ , and the support of  $p$  is contained in  $U$ . Hint: Partitions of unity.*

(5) Let  $f : \mathbb{R}^n \rightarrow \mathbb{R}^{n+1}$  be a  $C^1$  map. Prove that the image of  $f$  is a set of measure zero.  
*Hint: Munkres, Lemma 18.1.*