

# Topology Problem 10

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## Problem 10

We will work similarly to problem 5. Let  $x \in X$  and  $X = (x, v(x))$  where  $v : \mathbb{R}^n \rightarrow T(\mathbb{R}^n)$  be a vector field with finitely many singularities (whose indices add up to 0). Note that the index at any particular point is the degree of the map  $\frac{v}{|v|}$ . Now note that for all singularities  $s$ , we can use exercise 2 to see that the winding number  $W(x, \{0\}) = 0$ . From here, we use exercise 5 to find a function  $w$  such that  $v$  agrees with  $w$  on  $\mathbb{R}^n \setminus \{0\}$  outside a compact set. Finally, we construct our non-vanishing vector field  $Y$  as follows.

$$Y = (x, w(x))$$