1. Find a Weil function for the divisor consisting of the point with homogeneous coordinates $[0 : 0 : 1]$ (with multiplicity 1) on the curve $y^2z = x^3 - xz^2$ in $\mathbb{P}^2_k$, valid in characteristics $\neq 2, 3$.

2. Let $k$ be either a number field, a function field of transcendence degree 1 over a field $F$, or the completion of a field $k_0$ of either of those two types at a place $v \in M_{k_0}$. Let $X$ be a variety over $k$, and let $v \in M_k$. Show that, for any nonempty open affine $U = \text{Spec } A$ in $X$ and any isomorphism $A \cong k[x_1, \ldots, x_n]/I$ (where $I$ is an ideal in the polynomial ring $k[x_1, \ldots, x_n]$), the topology on $U(\mathbb{C}_v)$ induced by the $v$-topology on $X(\mathbb{C}_v)$ is the relative topology of $U(\mathbb{C}_v)$ as a subset of $\mathbb{C}_v^n = \mathbb{A}_v^n(\mathbb{C}_v)$.

3. Let $k$ be a field as in the previous problem, let $U = \text{Spec } A$ be an affine variety over $k$, and let $U_i = D(f_i)$, $i = 1, \ldots, n$, be an open cover of $U$ by principal open affines. Show that a subset $E \subseteq U(M)$ is affine $M$-bounded with respect to $U$ if and only if it can be written as $E = E_1 \cup \cdots \cup E_n$, where $E_i$ is an affine $M$-bounded subset of $U_i(M)$ for all $i$. 