Theorem 2: If M is a finite point set, then M has a right-most point and a left-most point.

Proof. Since M is finite, $\exists n > 0$ such that M has n points but not $n+1$ points. Label them $M = \{m_1, m_2, m_3, ..., m_n\}$ in a way that $m_1 < m_2 < m_3 < ... < m_n$.
Claim 1: m_1 is a left-most point of M.
Clearly, $m_1 \in M$. All points of M appear in the inequality
$m_1 < m_2 < m_3 < ... < m_n$. We observe that no point of M is less than m_1. Thus, m_1 is the left-most point of M.

Claim 2: m_n is the right-most point of M.
Clearly, $m_n \in M$. All points of M appear in the inequality
$m_1 < m_2 < m_3 < ... < m_n$. We observe that no point of M is greater than m_n. Thus, m_n is the right-most point of M.
$\therefore$ M has a right-most point and a left-most point. □

Contrapositive of Theorem 2: If M does not have a left-most point or a right-most point, then M is infinite.

Proof. **(by contrapositive)**
Assume M does not have a left-most point. Let $m_1 \in M$. Then $\exists m_2 \in M$ such that $m_2 < m_1$. Again, since M does not have a left-most point, $\exists m_3 \in M$ such that $m_3 < m_2$. Continue this process and we achieve the set $\{m_1, m_2, m_3, ...\} \subset M$ which is infinite.
Assume M does not have a right-most point. Let $m_1 \in M$. Then $\exists m_2 \in M$ such that $m_1 < m_2$. Again, since M does not have a right-most point, $\exists m_3 \in M$ such that $m_2 < m_3$. Continue this process and we achieve the set $\{m_1, m_2, m_3, ...\} \subset M$ which is infinite.
$\therefore$ if M does not have a right-most point or a left-most point, then M is infinite. □