To prove that the problem
\[
\min \sum_{i=1}^{k} |(c^i)^T x|
\]
\[st. \quad Ax \leq b\]
is correctly formulated by
\[
\min \sum_{i=1}^{k} (s_i + z_i)
\]
\[st. \quad s_i \geq 0, z_i \geq 0\]
\[\quad (c^i)^T x = s_i - z_i (i = 1, \ldots, k)\]
\[st. \quad Ax \leq b\]
we note

If \(a = s - z, \ s \geq 0, z \geq 0\), then \(|a| \leq s + z\), and \(|a| = s + z\) if and only if at most one of \(s\) and \(z\) can be positive. Eg. \(-12 = 4 - 16 = 0 - 12\), and \(12 < 4 + 16, 12 = 0 + 12\). Apply this result to \(a = (c^i)^T x, \ s = s_i, \ z = z_i\), and note that the minimization objective will force at least one of \(s_i\) and \(z_i\) to be zero.