One iteration of a standard-form simplex iteration.

% At the current vertex $x$, $B$ and $N$ denote the basic and nonbasic sets, with $x_N = 0$;

% Step 1: Solve for the multipliers $\pi$ and $z$;
Solve $B^T\pi = c_B$; $z_N \leftarrow c_N - N^T\pi$;
if $z_N \geq 0$ then break; % $x$ is optimal;

% Step 2: Pick the entering variable, a nonbasic variable that becomes basic;
Choose $s$ such that $[z_N]_s < 0$;

% Step 3: Calculate the search direction for the basic variables;
Solve $Bp_B = -a_{\nu_s}$, where $\nu_s$ is the $s$th index in $N$ and $a_{\nu_s}$ is column $\nu_s$ of $A$;

% Step 4: Find the maximum feasible step along $p$ using the min ratio test;
$D \leftarrow \{j : [p_B]_j < 0\}$; % Identify the decreasing basic variables;
if $D = \emptyset$ then break; % The objective is unbounded below in the feasible region;
for $j \in D$, $\gamma_j \leftarrow [x_B]_j / (-[p_B]_j)$ end;
$\alpha_M \leftarrow \min\{\gamma_j\}$ for $j \in D$; % $\alpha_M$ is the maximum feasible step;
$\alpha \leftarrow \alpha_M$; $x_B \leftarrow x_B + \alpha p_B$; $[x_N]_s \leftarrow \alpha$; % $N$; $B$ with the old $N$ and $B$;

% Step 5: Pick the leaving variable, a blocking basic variable that becomes nonbasic;
$S \leftarrow \{j \in D\}$ such that $\gamma_j = \alpha_M$; % $S$ contains the blocking constraint indices;
Choose $t \in S$; % Update the basic and nonbasic index sets;
$N \leftarrow N - \{\nu_s\} + \{t\}$;
$B \leftarrow B - \{\beta_t\} + \{\nu_s\}$;
% Update $B$ and $N$;
$B \leftarrow B$ with column $t$ replaced by column $\nu_s$ of $A$;
$N \leftarrow N$ with column $s$ replaced by column $\beta_t$ of $A$;
A drastically rescaled version of a 2-d Klee-Minty example.

Figure 1: A rescaled Klee-Minty problem, with constraints $x_1 \geq 0$, $x_2 \geq 0$, $x_1 \leq 1.4$, and $1.5x_1 + x_2 \leq 2.5$. We seek to maximize $1.2x_1 + x_2$; the dotted contour lines of the objective are shown, with increasing values moving up the feasible region. It is obvious that the “highest” vertex $(0, 2.5)^T$ is optimal.