A summary of degeneracies.

1. M-method or Two-phase method

1.1. one of y_i's becomes basic at positive level or $x_0^* < 0$

$\Rightarrow$ feasible region is empty

1.2 one of y_i's becomes basic at zero level and $x_0^* = 0$

$\Rightarrow$ use Alternate Rule

2. Check the last simplex table

	x_1	$\cdots x_j$	x_n	b
x_{B_1}				
$\vdots$				
x_{B_m}				
x_0	z_1-c_1	z_j-c_j	z_n-c_n	

2.1 If $\exists$ a column $\vec{y_j} = \begin{pmatrix} y_{1j} \\ \vdots \\ y_{mj} \end{pmatrix} \le 0$ $\Rightarrow$ feasible region is unbounded in x_j

2.2 If $\exists$ a column $\vec{y_j} = \begin{pmatrix} y_{1j} \\ \vdots \\ y_{mj} \end{pmatrix} \le 0$ and $z_j - c_j < 0$ $\Rightarrow$ feasible region is unbounded in x_j and optimal value $= +\infty$

2.3. If $z_j - c_j > 0$ for all non-basic variables, then the optimal solution is unique

2.4 : If $z_j - c_j = 0$ for some non-basic j, and either $\vec{y_j} \le 0$ or $\min\left\{ \frac{x_{B_i}}{y_{ij}} \middle| y_{ij} > 0 \right\} > 0$, then $\exists$ $+\infty$-many optimal sol'ns

$$(x_{B_1} - \theta y_{1j}, \cdots, x_{B_m} - \theta y_{mj}, 0, \cdots, \underset{\substack{\uparrow \\ x_j}}{\theta}, \cdots, 0), \quad 0 < \theta < \min\left\{ \frac{x_{B_i}}{y_{ij}} \middle| y_{ij} > 0 \right\}$$