Parametric Programming:

Example:

Set up simplex tableau:

	0	$-3+2\theta$	$3-\theta$	1	0	0
x_4	5	1	2	-3	1	0
x_5	7	2	1	-4	0	1

If $-3+2\theta \geq 0$ and $3-\theta \geq 0$, then solution is optimal $\Rightarrow g(\theta)=0$ for $\frac{3}{2} \leq \theta \leq 3$

Consider $\theta > 3 \Rightarrow \bar{c}_2 < 0$, do pivoting step:

	$-7.5+2.5\theta$	$-\frac{3}{2}+\frac{5}{2}\theta$	0	$\frac{11}{2}-\frac{3}{2}\theta$	$-\frac{3}{2}+\frac{1}{2}\theta$	0
$x_2=$	$\frac{5}{2}$	$\frac{1}{2}$	1	$-\frac{3}{2}$	$\frac{1}{2}$	0
$x_5=$	$\frac{9}{2}$	$\frac{3}{2}$	0	$-\frac{5}{2}$	$-\frac{1}{2}$	1

optimal for $3 \leq \theta \leq \frac{11}{3}$

$g(\theta) = 7.5 - 2.5\theta$ for $3 \leq \theta \leq \frac{11}{3}$

If $\Theta > \frac{11}{3}$, then $\bar{c}_3 < 0$ and the problem is unbounded (we have found an extreme ray, i.e. 3rd basic direction, with negative cost).

Consider now the situation for $\Theta < \frac{3}{2}$ (go back to initial tableau):

$\bar{c}_1 < 0$

	$10.5-7\Theta$	0	$4.5-2\Theta$	$-5+4\Theta$	0	$1.5-\Theta$
x_4	$3/2$	0	$3/2$	-1	1	$-1/2$
x_1	$7/2$	1	$1/2$	-2	0	$1/2$

optimal for $\frac{5}{4} \leq \Theta \leq \frac{3}{2}$

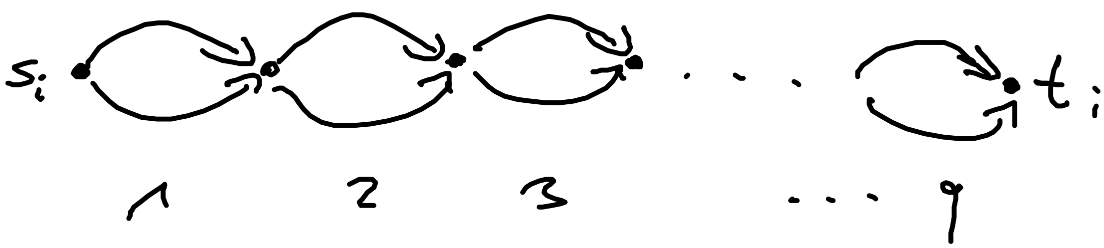
$$g(\Theta) = 10.5 - 7 \cdot \Theta \quad \text{for } \frac{5}{4} \leq \Theta \leq \frac{3}{2}$$

For $\Theta < \frac{5}{4}$, $\bar{c}_3 < 0$ and the problem is unbounded.

$$g(\Theta) = -\infty \quad \text{for } \Theta < \frac{5}{4}$$

This approach works for arbitrary parametric programs....

If an anti-cycling rule is being applied (e.g. lexicographic rule), then the algorithm will terminate after finitely many steps since it visits every basic feasible solution at most once...



$|B_i| = 2^q$ $\quad$ $|A| = 2q$