Example of Active Set Method for a Constrained Optimization Problem

Basic QP problem elements: $q(x) = \frac{1}{2}x^T G x + x^T d$ where

$$G = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}, \qquad d = \begin{pmatrix} -4 \\ -4 \end{pmatrix}.$$

The constraints are

1. $-2x - y \geq -2$
2. $-x + y \geq -1$
3. $x + y \geq -1$
4. $2x - y \geq -2$

The feasible region is a diamond with vertices at $(\pm 1, 0)$, $(0, 2)$ and $(0, -1)$.
Initial point is $x_0 = (-1, 0)$ with $W_0 = \{3, 4\}$.

k	x_k		W_k	p_k		λ_k	α	Comments
0	-1	0	$\{3,4\}$	0	0	$\{-14/3, -2/3\}$	-	3 becomes inactive
1	-1	0	$\{4\}$	1.4	2.8	$\{-1.6\}$	0.7143	move until 1 becomes active
2	0	2	$\{4,1\}$	0	0	$\{-1, 1\}$	-	4 becomes inactive
3	0	2	$\{1\}$	0.4	-0.8	$\{1.6\}$	1	move to $x + p$
4	0.4	1.2	$\{1\}$	0	0	$\{1.6\}$	-	Done