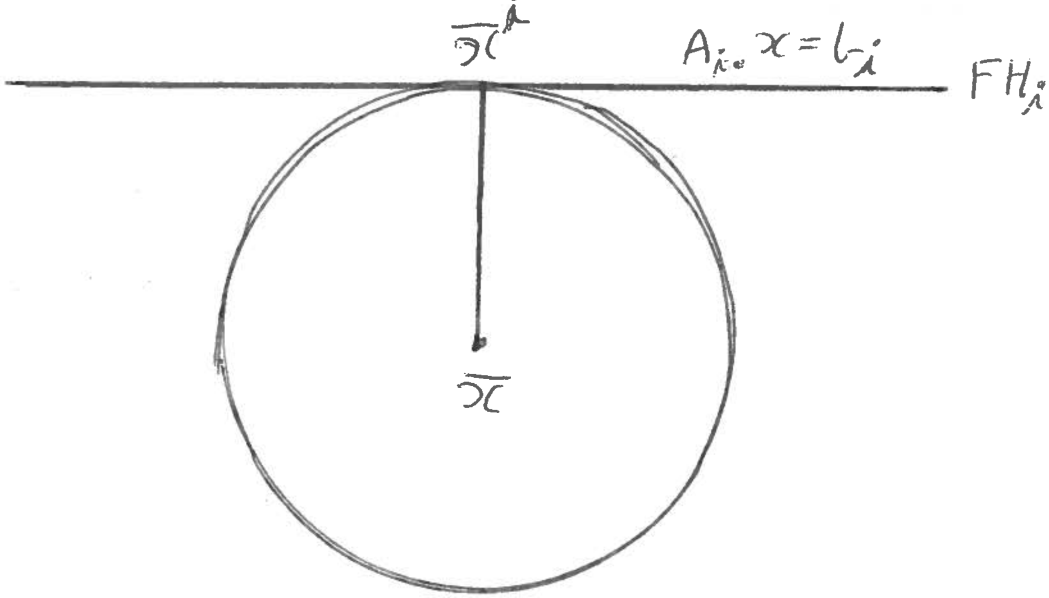


Figure 1.

$A_{\{i\cdot\}}$

$\bar{x}^i$

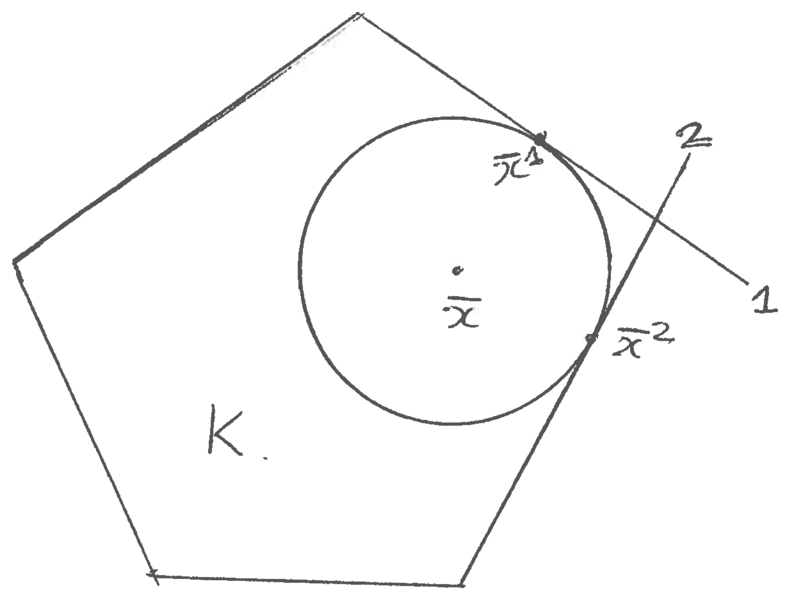


Figure 2

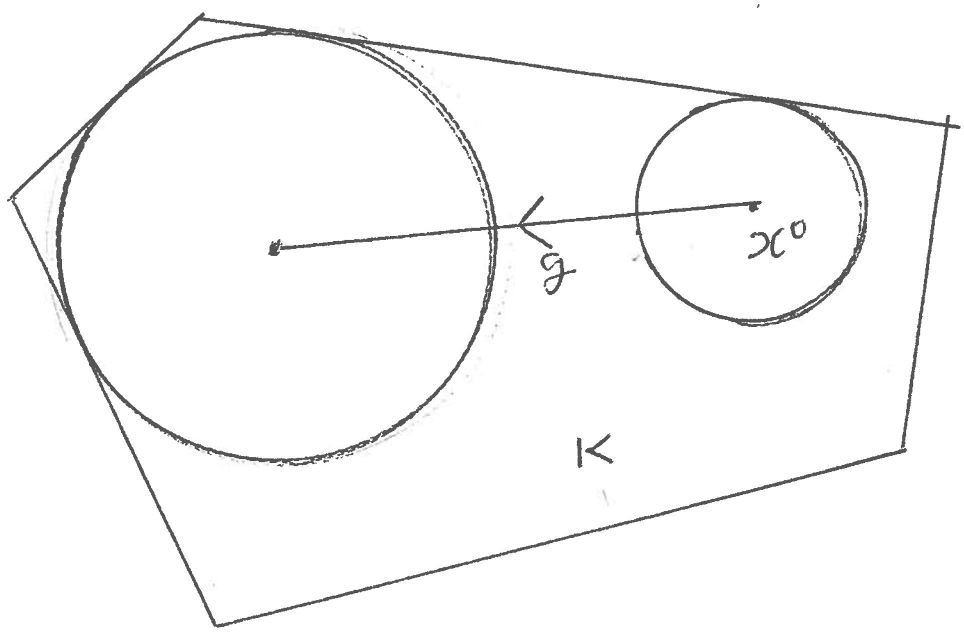


Figure B: Moving from the point x^0 in K in the direction g indicated by the arrow, traces the point $x^0+\alpha g$ as α increases from 0. g is a profitable direction at $x^0 \in K$ since $S(x^0+\alpha g)$ is increasing at $\alpha = 0$, as α increases from 0.

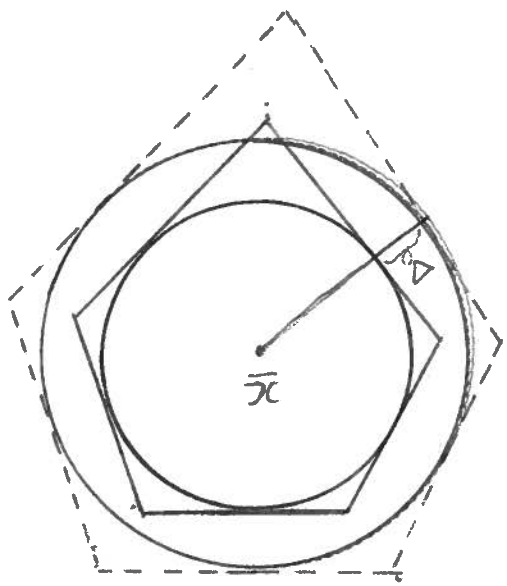


Figure 4: K, the original set of feasible solutions for (1) is shown in solid lines. Its ball center is unique, it is $\bar{x}$. The largest ball inscribed in K is the smaller ball $B(\bar{x}, K)$, with $\bar{x}$ as center in the figure. Each facet of K is moved parallel to itself outward by a distance of $\Delta > 0$, leading to $K(\Delta)$ shown with dashed lines. $\bar{x}$ is also the unique ball center of $K(\Delta)$. $B(\bar{x}, K)$ and $B(\bar{x}, K(\Delta))$ are concentric.

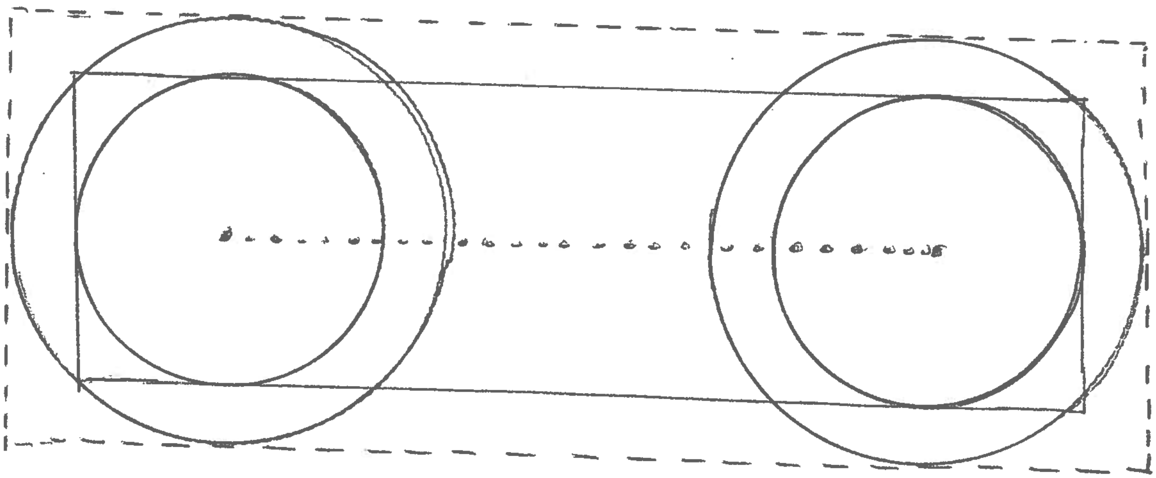


Figure 5: K, the original set of feasible solutions for (1) is the rectangle in solid lines; and K(Δ) is the rectangle in dashed lines obtained by moving every facet of K outward by a distance of $\Delta > 0$. Every point on the dotted line inside, is a ball center of both K and K(Δ).

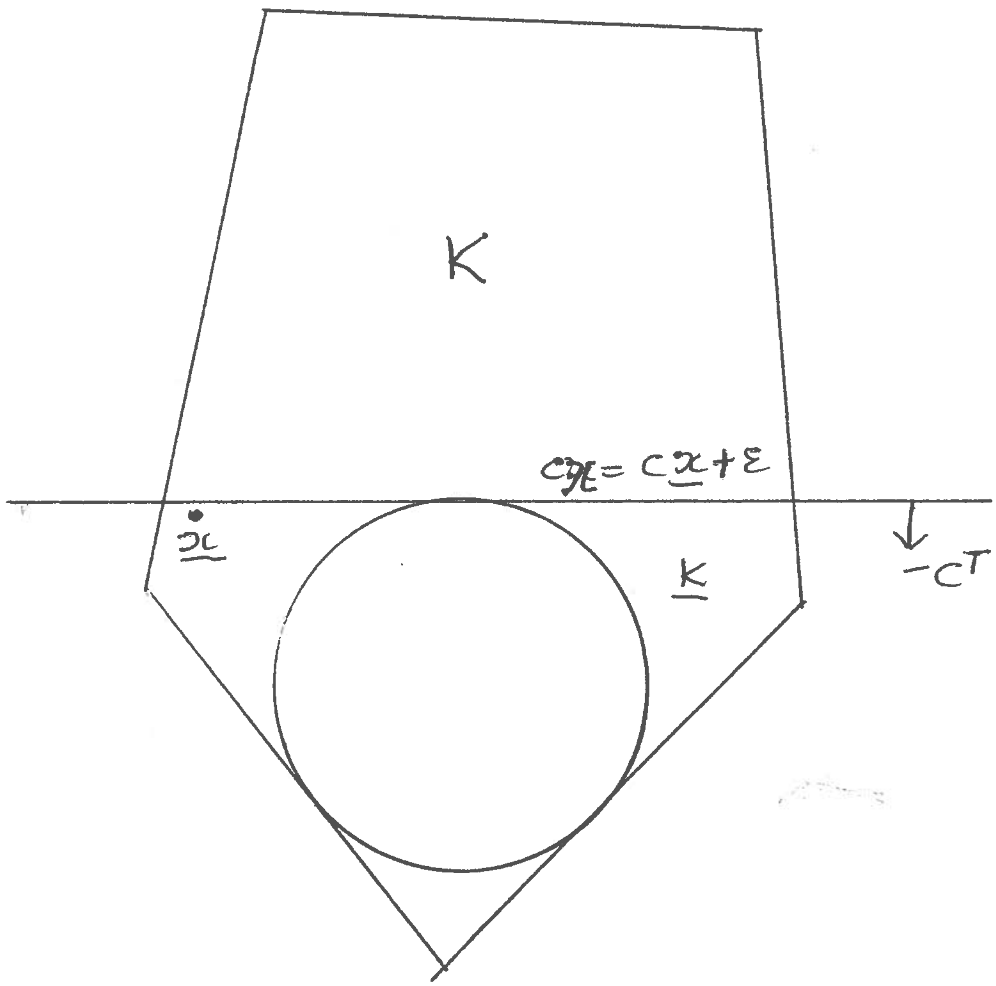


Figure 6: K is the set of feasible solutions of the original LP being Solved. $\underline{x}$ is the initial IFS of K for the Current iteration. The current set of feasible solutions under Consideration is $\underline{K}$. The ball shown is the largest ball inside $\underline{K}$, the aim of this Centering cycle is to Compute a good approximation for its Center.

$\underbar{K}$, $\underbar{x}$.

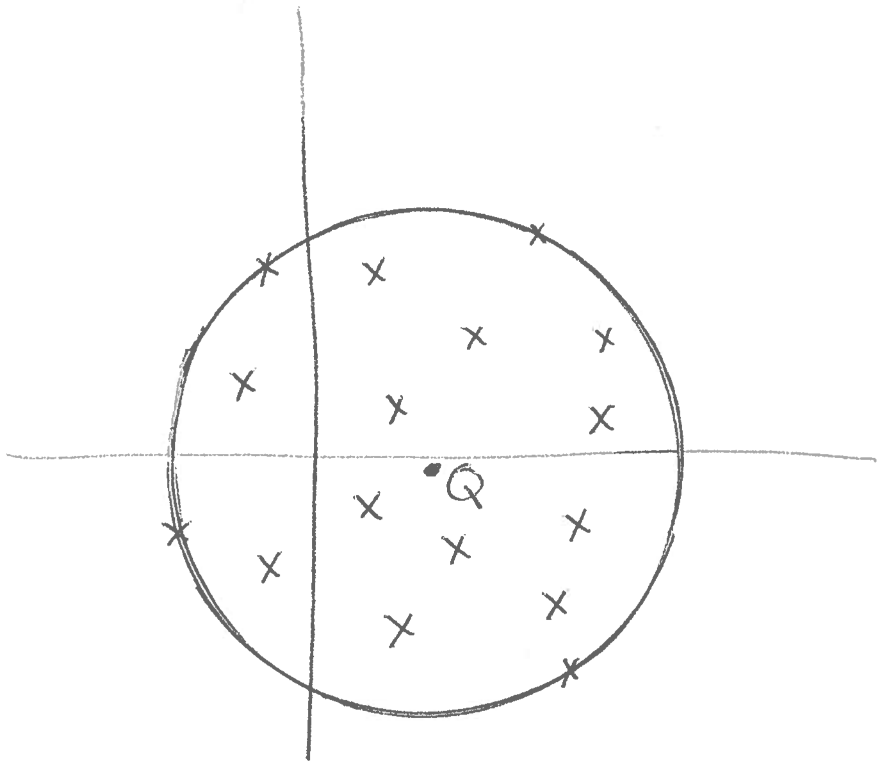


Figure 7: Given a set of points, each marked by an × in R^2, the MES (Minimum Enclosing Sphere) containing all these points is shown. Q is its center.

Both portions of the lines are marked

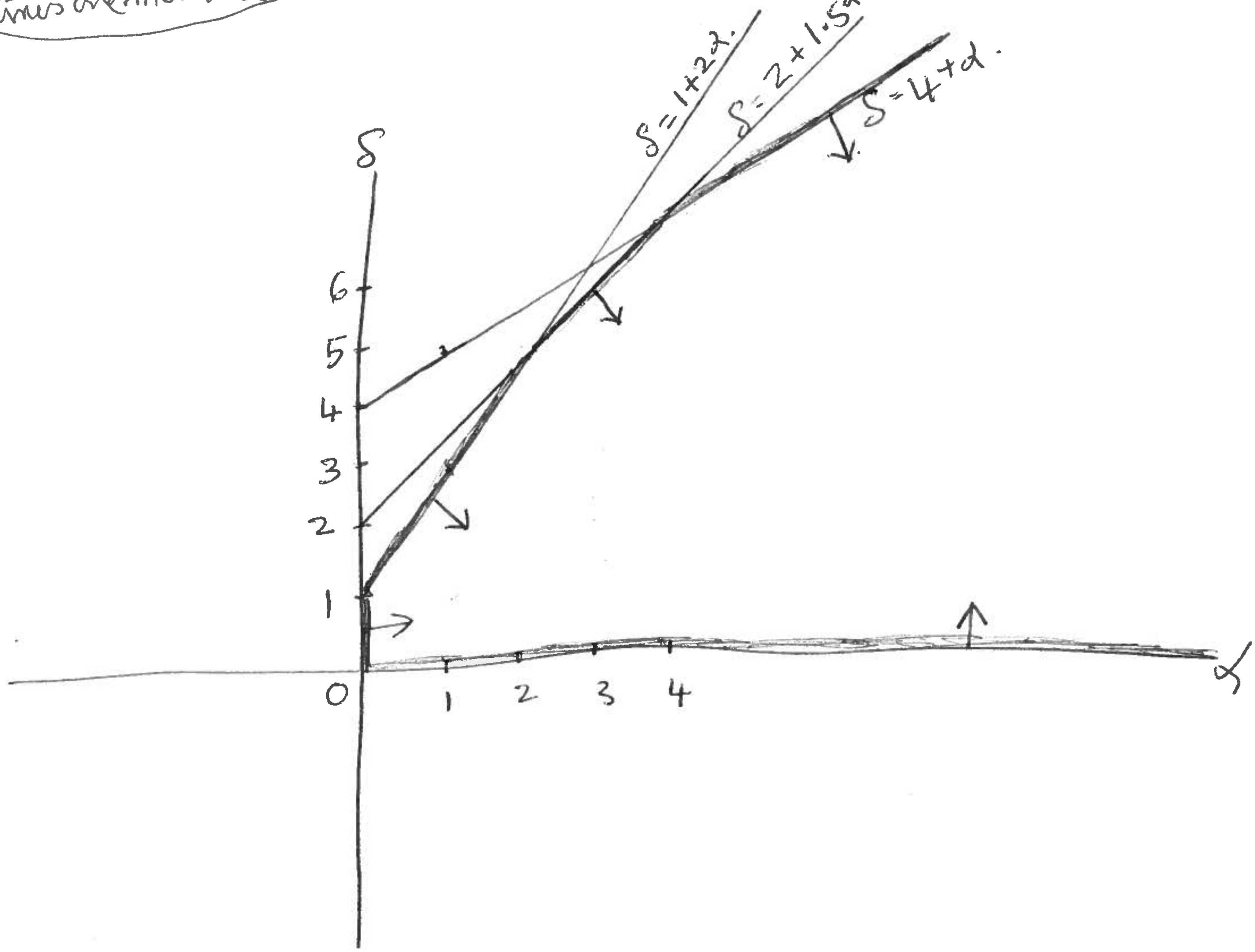


Figure 8: Set of feasible solutions of the system:

$\delta - \alpha \leq 4$, $\delta - 2\alpha \leq 1$, $\delta - 1.5\alpha \leq 2$, $\delta, \alpha \geq 0$.

Maximum value of δ in this set is $+\infty$.

Gold Portions of the lines are marked.

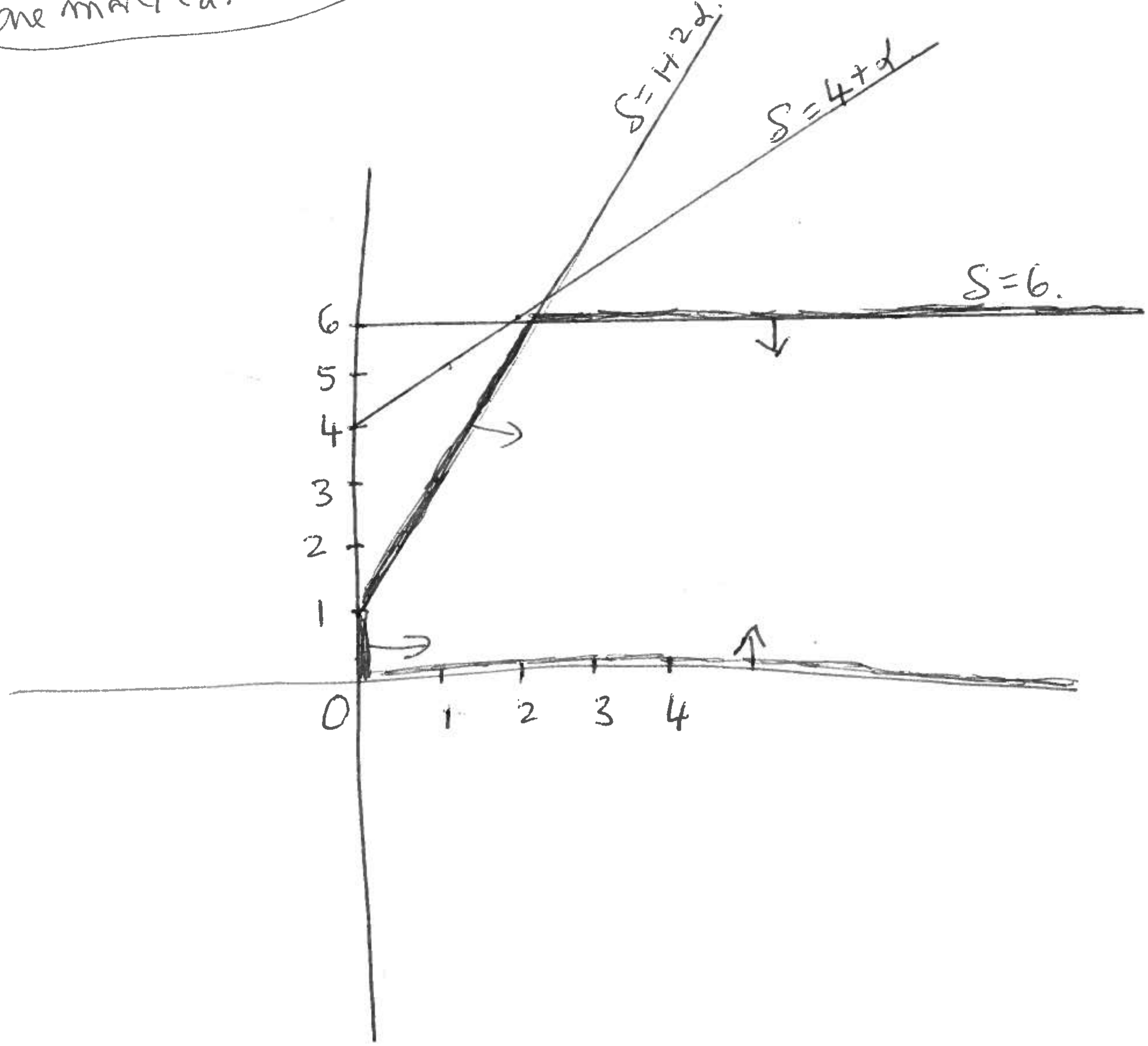


Figure 9 : Set of feasible solutions of the system:

$S-2\alpha\leq 1$, $S-\alpha\leq 4$, $S\leq 6$, $S,\alpha\geq 0$. Maximum value of S in this set is 6 .

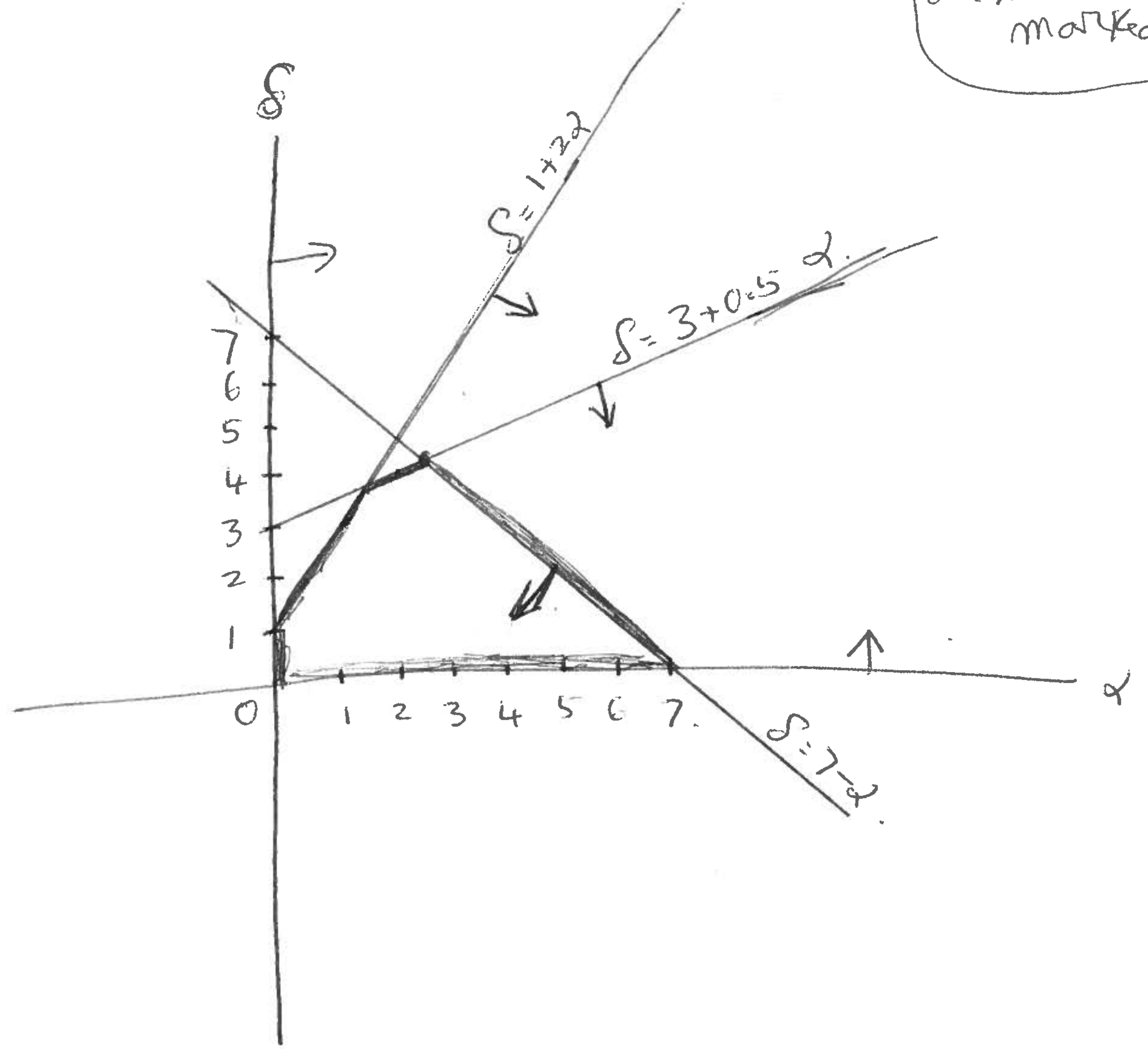


Figure 1: Set of feasible solutions of the system: $\delta \leq 7-\alpha$, $\delta \leq 1+2\alpha$, $\delta \leq 3+0.5\alpha$, $\delta, \alpha \geq 0$. Maximum value of δ in this set is attained at the point $(\delta, \alpha) = (13/3, 8/3)$.

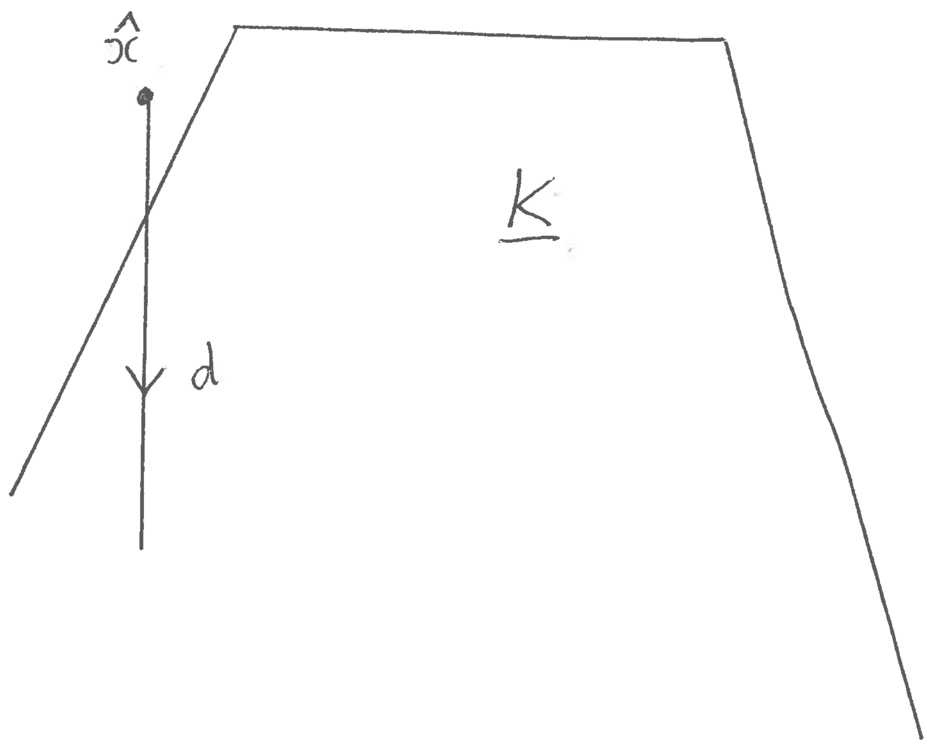


Figure 11: The point $\hat{x}$ from which the descent step is taken is outside of $\underline{K}$, and the descent-direction d indicated by the arrow both together satisfy Conditions 1, 2; so the half-line M intersects the interior of $\underline{K}$. Also none of the coefficient vectors $A_{i.}$ in the definition of $\underline{K}$ (defined in Step 1 in Section 3.1) satisfy $A_{i.} d < 0$; so the maximum step length from $\hat{x}$ in the descent direction d is $+\infty$, and $M \cap \underline{K}$ is a feasible half-line along which $cx \to -\infty$.

Use figure on next page

Better copy on next page.

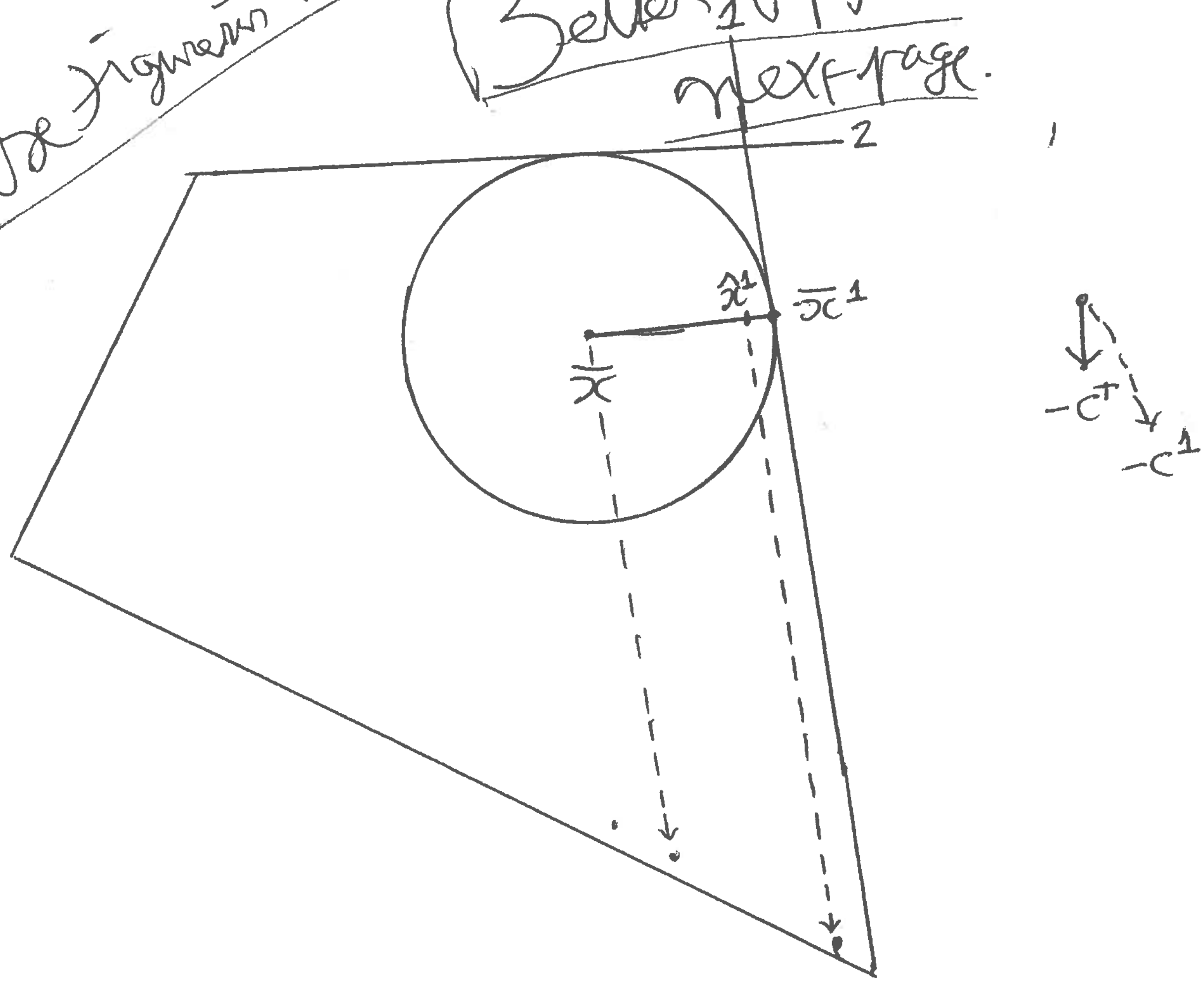
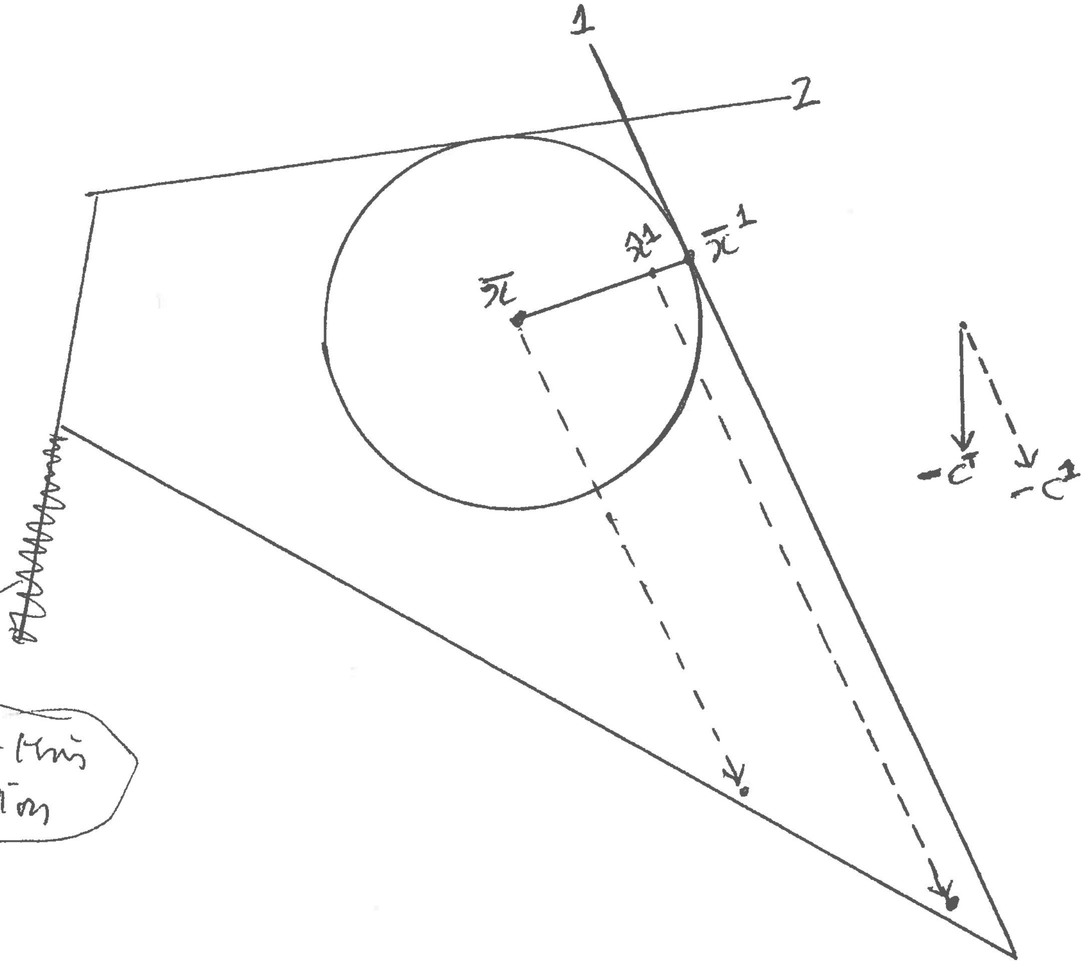


Figure 12: $\bar{x}$ is the current center, $T(\bar{x}) = \{1, 2\}$. Descent direction $-c^T$ points down south, $-c^1$ = orthogonal projection of $-c^T$ on facetal hyperplane of constraint 1. $\bar{x}^1$ is the touching point on constraint 1. $\hat{x}^1$ = NTP corresponding to constraint 1. Descent steps from $\bar{x}$, $\hat{x}^1$ in descent direction $-c^1$ are shown, here descent step from $\hat{x}^1$ leads to higher reduction in objective value.

all dashed lines are parallel. $-c^T$ points south.



omit this portion

Figure 12.

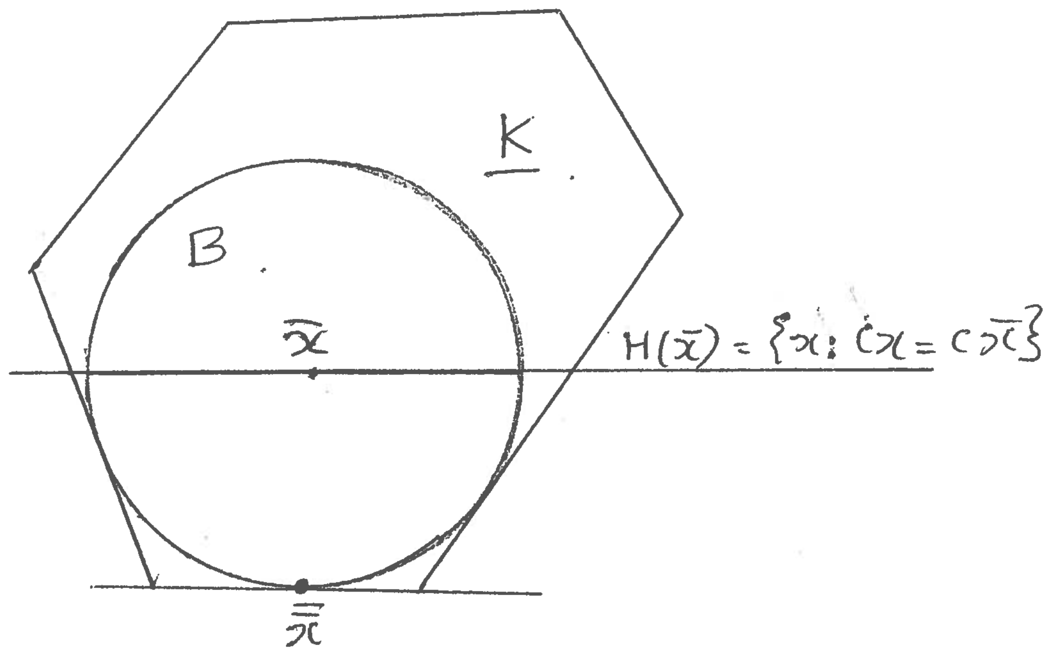


Figure 13: When the objective plane $H(\bar{x})$ through the center of B is moved parallel to itself in the direction $-c^T$ until it becomes a tangent plane to B, touching it at a point $\bar{\bar{x}}$; if $\bar{\bar{x}}$ is a boundary point of $\underline{K}$, it is an optimum solution of the original LP (1), and $H(\bar{\bar{x}})$ is a facetal hyperplane of $\underline{K}$ and K.

`$\bar{\bar(x)}}$`

$H(\bar{x})$ and $H(\bar{\bar{x}})$ are both horizontal

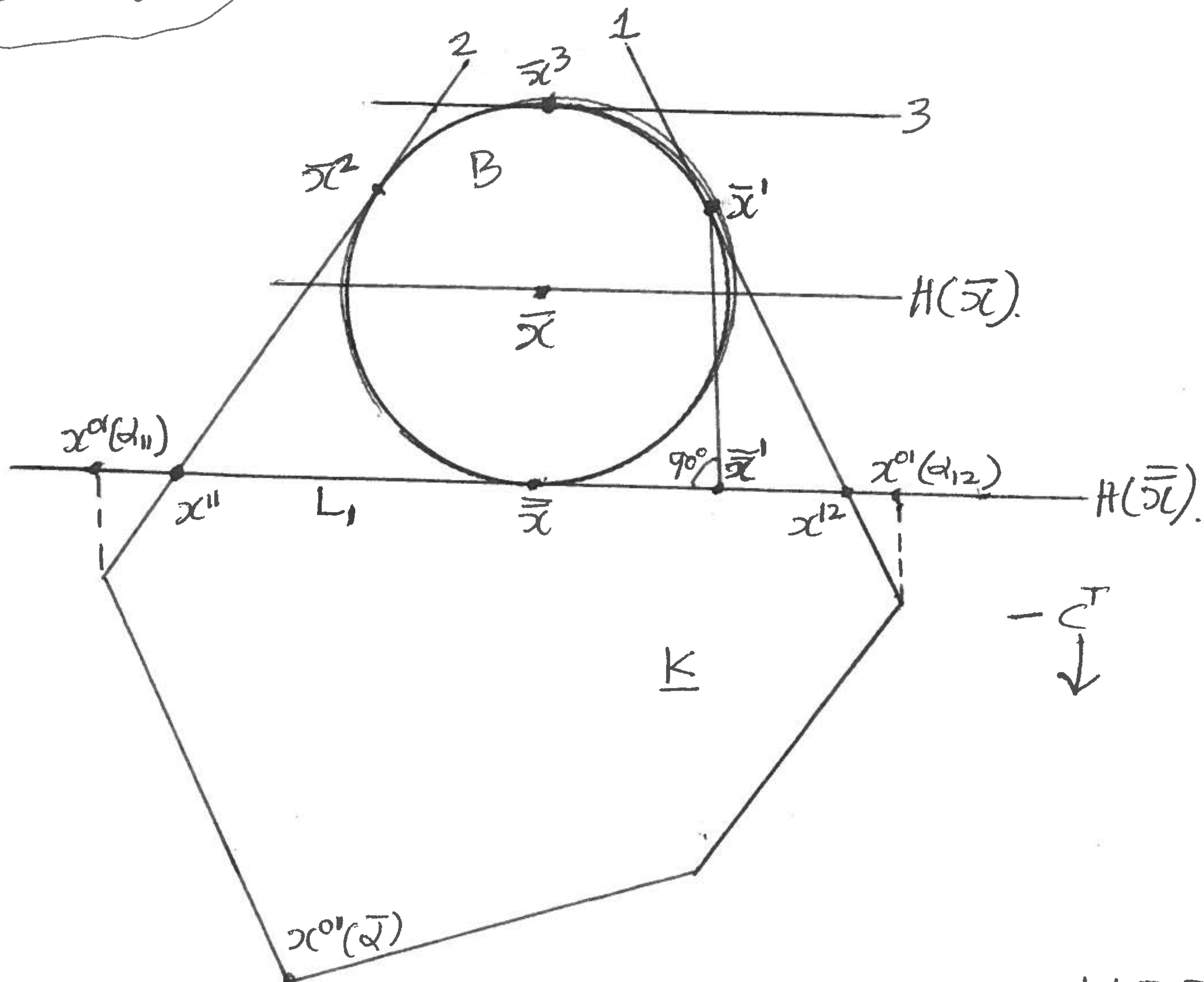


Figure 14: The Ball B with center $\bar{x}$ has 3 touching facets numbered 1, 2, 3 with touching points $\bar{x}^1, \bar{x}^2, \bar{x}^3$ respectively. The objective plane $H(\bar{x})$ is moved parallel to itself in the direction $-c^T$ until it becomes a tangent plane to B, ~~$\bar{\bar{x}}$ is the~~ let $\bar{\bar{x}}$ be ~~the~~ its touching point with B. We will illustrate steps 3.2.5, 3.2.6 with the touching facetal plane corresponding to $i=1$. $\bar{\bar{x}}^1$ is the orthogonal projection of $\bar{x}^1$ on $H(\bar{\bar{x}})$ and the line joining $\bar{\bar{x}}$ and $\bar{\bar{x}}^1$ is L_1 (in this 2-dimensional figure it is the same as $H(\bar{\bar{x}})$. In higher dimensions $H(\bar{\bar{x}})$ will be a hyperplane and L_1 will be a straight line on it. x^{11}, x^{12} are the two boundary points of K on $L_1 \cap$ K. All points x on L_1 satisfying the property that the

Fig 14 Contd.

descent line from it in the direction $-\bar{c}^T$ intersects $\underline{K}$, are those ~~$x(\alpha)$~~ $x^{01}(\alpha)$, $\alpha_{11} \le \alpha \le \alpha_{12}$ (i.e., those between $x^{01}(\alpha_{11})$ and $x^{01}(\alpha_{12})$. Minimizing $f^1(\alpha)$ over $\alpha_{11} \le \alpha \le \alpha_{12}$ gives the point $x^{01}(\bar{\alpha})$.