Quadratic Surfaces

Say we have a constant C

Curves in $\mathbb{R}^2$

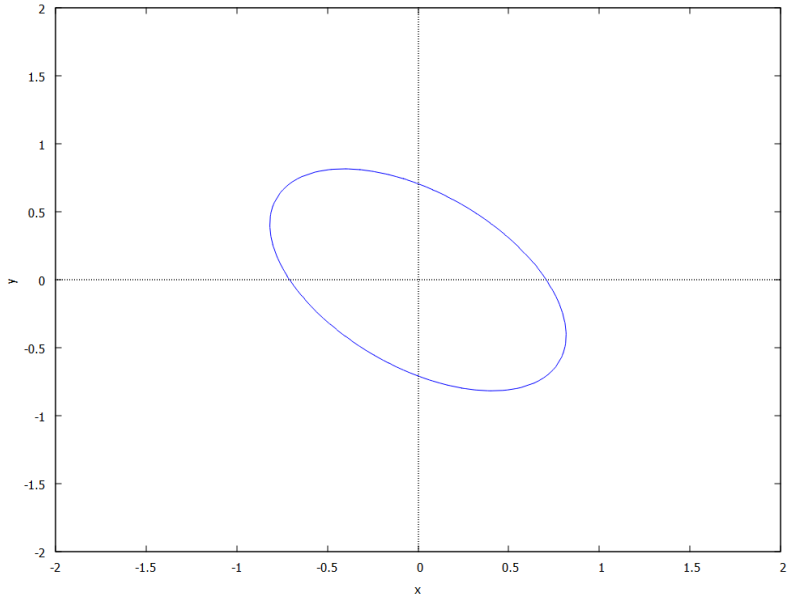
$Q(x) = x^T Ax$ where $A \in \mathbb{R}^{2\times 2}$. Then,

$$C = x^T Ax$$

Is a curve in $\mathbb{R}^2$.

Say $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$. Then $Q(x) = 2x^2 + 2y^2 + 2xy = C$.

If $C = 1$ we can plot,



Here is it plotted when we changed C