

Graphing parabola

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Instructions for execution:

The program is made with the python language.

First, the user will be asked to choose an option 1 or 2 depending on the type of parabola equation in general form. The equation must be in the form $Ay^2 + By + Cx + D = 0$ (option 1), or $Ax^2 + Bx + Cy + D = 0$ (option 2).

Then the program will ask for the coefficients of said equation, the user must write them separating them by a space. For example, if the equation were of the form " $y^2 - 8y - 8x + 40$ ", the user would first type "1" as an option. Then the user will write the coefficients "1 -8 -8 40".

The program will display a graph of the parabola and print data about it, such as the vertex, focus, straight side, etc.

Introduction

The term parabola is defined as: "locus of all points in the plane that are equidistant from a fixed line called directrix and from a fixed point called focus".

During this project it is expected to graph a parabola given its equation in a general way, as well as present its elements.

Parabola type	Ordinary equation	General equation
Horizontal	$(y - k)^2 = 4p(x - h)$	$Ay^2 + By + Cx + D = 0$
Vertical	$(x - h)^2 = 4p(y - k)$	$Ax^2 + Bx + Cy + D = 0$

Methodology

For the beginning of the project, the general objective was established, which is to graph a parabola given its equation and present its elements.

Subsequently, work was done on the development of the code to carry out the graphing of the equation, during this journey the general equation of each parabola was studied to obtain formulas that will optimize data collection, for example the coordinates of the vertex, and generalize it. for each case depending on whether it is vertical or horizontal.

Code implementation and testing

First, the user must have an equation of a parabola with which the process will be carried out. For example, the equation: $x^2 - 6x + 12y + 69 = 0$

Then, the user is asked to choose an option depending on the type of parabola to which the equation corresponds.

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Si tu ecuacion es de la forma Ay^2 + By+ Cx+D=0, escribe 1, si es de la forma Ax^2 + Bx+ Cy+D=0, escribe 2. Cualquier otro caso, no es parabola:2
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In this case, the user must choose option 2, since the structure of the equation corresponds to a vertical parabola

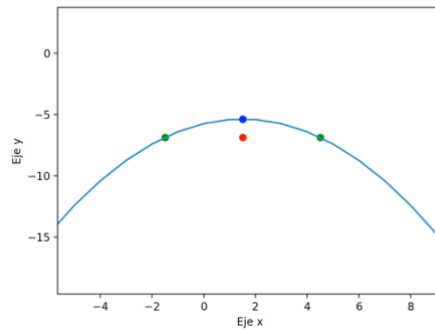
Afterwards, the user must write the corresponding coefficients in the equation, separating them by a space, in case some element does not appear in the equation, for example if there is no "x", the user must write a 0 as coefficient.

```
Escribe los coeficientes conforme a la ecuación general de una parábola separado por espacios: 
```

In this case the user must write 2 -6 12 69.

```
Escribe los coeficientes conforme a la ecuación general de una parábola separado por espacios: 2 -6 12 69
```

The program will show the graph of the parabola with the points of the vertex (blue color), of the focus (red color), and the points of the ends of the straight side (green color). In addition, it will show some data of the elements of the parabola.



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Las coordenadas del vertice son: (1.5, -5.375)
Las coordenadas del foco son: (1.5, -6.875)
La ecuacion ordinaria es: (x-1.5)^2 = -6.0(y+5.375)
La longitud del lado recto es: 6.0
Las coordenadas de los extremos del lado recto son: ((-1.5, -6.875), (4.5, -6.875))
```

Results and conclusion

The program gives the correct results. In conclusion, the project served as a means for an implementation of what was seen in class on the topic of the parable, it was learned about the development of a code to be able to implement it with the topic and in turn present it on GitHub.