

Exercise 1:

Find all the points in The Algarve that have a distance to Faro plus the distance to Olhão equal to 10 km. (Use Wolfram Alpha: <u>http://www.wolframalpha.com/</u>).



Exercise 2:

Find the solution for the set of linear equations

x + y + z = 2 x - y = 22x + 2y + z = 2

Exercise 3:

a) Plot the solution of the differential equation

 $\frac{dy(x)}{dx} = \sin^2(x) - \cos(x)$

between 0 and 2π . (Boundary condition: y(0) = 1). Use Octave. Useful function: lsode. Check the solution with Wolfram Alpha.

Note: The solution of lsode is given in a horizontal array (for example 300x1), whereas x constructed with linspace is a vertical array (for example 1x300). To convert between the two, use '. For example: y' converts the horizontal (vertical) array to a vertical (horizontal) array.

b) Plot, in the same figure, the solution of this equation, plus the analytical derivative (equation above) and the numerical derivative, $\Delta y / \Delta x$. Use function diff() of Octave for this numerical derivative.

Note: Since the latter is the difference between elements of the vectors it has one data point less. How to solve it?