Homework 3: SAGE and ODE solving

due date: November 16 2018

You will need to review the SAGE lectures and code examples.
We have a a coupled system of two differential equations

$$\frac{dx}{dt} = y$$

$$\frac{dy}{dt} = -x$$

Deliver the following in a notebook and a PDF, you can print the notebook into a PDF using the 'file' and you can also export the notebook onto your computer (on a mac it will be saved by default into the Download folder).

1. (10 points) solve the system using the `desolve_system_rk4` or a similar one (check the codes section for potential examples)
2. (10 points) plot x versus t and y versus t in the sample plot, pick red for $x(t)$ and blue for $y(t)$
3. (10 points) plot x versus y use the color green.
4. (10 points) plot the vector field for x and y and overlay it with the plot from (3).

Submit the notebook and the PDF to canvas.