# Python H.W.1

In physics, a vector field is an assignment of a vector to each point in a subset of space used to model electric or gravitational field. You can see Wikipedia to learn more. (https://en.wikipedia.org/wiki/Vector_field)
There are some useful python tools to simulate a vector field in this homework.

- numpy.mgrid: https://numpy.org/doc/stable/reference/generated/numpy.mgrid.html
- matplotlib.pyplot.streamplot: https://www.geeksforgeeks.org/matplotlib-pyplot-streamplot-in-python/

(a) Consider a charged ring with radius $R = 1\,\mathrm{m}$ and linear charge density $\lambda = 4\,\mathrm{C/m}$ lays in the center of X-Y plane. Plot the electric field distributed on X-Y, Y-Z and X-Z plane with a 20m×20m streamplot.

(b) Now, replace the ring with a nonuniform charged disk whose radius is $R = 5\,m$ and surface charge density is $\boldsymbol{\sigma(r) = \sigma_0 r}\ \mathrm{C/m^2}$. Plot the electric field distribution as in (a).