**8.02 - FRIDAY COMPUTATIONAL THINKING - Week 2**

**Physics Learning objectives:**

1. To comprehend the meaning of Gauss's Law.
2. To understand why Gauss's Law is useful to calculate electric fields in situations with high degrees of symmetry: planar, cylindrical, and spherical.
3. To reflect about the meaning of "infinite" in physics i.e. "how and when is an infinite cylinder approximation useful if a charged cylinder is reality finite?"

**CS Learning objectives (exploring the hidden code)**

* Review lists
* Review functions (why they are used, syntax)
* Review basic use of NumPy arrays
* Start developing an understanding of the role computation can play in solving problems.

**In class group problem solving:**

<https://mybinder.org/v2/gh/ESG-802/spring21/HEAD?filepath=%2F2-%20Electric%20Flux%20and%20Gaussian%20Surfaces.ipynb>

**INSTRUCTORS NOTES:**

This is the location or the original files: <https://mybinder.org/v2/gh/ESG-802/spring21/HEAD>

If you make changes the students will not see them unless you commit them in Github

**POSSIBLE EXTENSION (with coding):**

Plan:

* Write a function to convert from cartesian to spherical/cylindrical coordinates
* Write a function to create a given charge configuration.
* Define \vec dA and dV
* Scan over the gaussian surface split into dA.
* For each piece, calculate the electric field at the center of this “square”.
* Use the area of the small square and the electric field to calculate the flux.
* Repeat for all other squares.
* Add up all the tiny pieces of flux.