

Physics 566 Problem Set #4

Reading: CP Chapters 6

Available February 15th

Due March 1st

Please follow the guidance of last week and, like before, please turn in (by attachment in the Sakai assignment) both a PDF exported version of the notebook and the .ipynb file itself. You will need to have read and understood the material at least through section 5.8. If you need to work out new equations etc for the problem please use LaTeX formatting to show what you did in your answers.

- (1) **5.21 parts a and b** [Calculating the electric field by differentiating the potential. Note: one nice way of drawing a vector field is with the matplotlib 'quiver' command (instead of 'plot'). Also, in case it is ambiguous, once charge should be positive, one negative.]
- (2) **6.1** [Resistor Circuit]
- (3) **6.2** [Partial Pivoting]
- (4) **6.3 parts a and b** [LU decomposition]
- (5) **6.4** [Same as 6.1 but use 'solve' from numpy]
- (6) **6.7** [More circuits. Use the fact that the matrix A is banded in part b) also so you can use the same program in part c.] Plot the results (internal voltage vs internal point)
- (7) **6.8 parts b and c** [The QR algorithm]
- (8) **6.9 parts a, b and c** [Asymmetric Quantum Well. For part b) write a function to use in part c. For doing the QM calculation in parts a) and b) if you wish you can do the math separately in LaTeX and submit a separate PDF. But, you should be able to do it in the notebook.]
- (9) **6.16** [Lagrange Point. Use the secant method. The distance to the L1 point is 326045 km]