Problem 5.1

Find the currents in the unbalanced Wheatstone bridge (Fig. 5.1). Assume that $v_0 = 1.5V$, $r_1 = r_2 = 100\Omega$, $r_3 = 150\Omega$, $r_x = 120\Omega$, $r_a = 1000\Omega$, and $r_s = 10\Omega$.

Use Gaussian elimination with partial-pivoting. Vary v0 and plot your answers versus v0.

Problem 5.5

Apply the secant method to obtain the stable geometric structure of clusters of ions $(\text{Na+})_n$ $(\text{Cl-})_m$, where n and m are small positive integers. Use the empirical interaction potential given in Eq. (5.64) for the ions.

$$V(r_{ij}) = \eta_{ij} \frac{e^2}{4\pi\epsilon r_{ij}} + \delta_{ij} V_0 e^{-r_{ij}/r_0}$$

Consider the following cases for n and m: (n=1, m=1), (n=2, m=1), (n=2, m=2), and (n=3, m=2).

Present your results using two methods:

1. Create a table of solutions where the coordinates are listed for all these (n, m) combinations.
2. Use a plotting or drawing package to create geometrically accurate "ball and stick" drawings of your molecules.

Note that Fig. 5.2 in your text plots a stable structure for the n=3, m=2 case, so no need to plot that case. Example drawing packages include: the 2D plotting package you've been using, Google Slides, or something more sophisticated (if you're interested):

https://molview.org

http://biomodel.uah.es/en/DIY/JSME/draw.en.htm

Hint: Use symmetry to simplify and reduce the number of variables to solve for.