Union College recognizes the need to create an environment of mutual trust as part of its educational mission. Responsible participation in an academic community requires respect for and acknowledgement of the thoughts and work of others, whether expressed in the present or in some distant time and place.

Matriculation at the College is taken to signify implicit agreement with the Academic Honor Code, available at honorcode.union.edu. It is each student's responsibility to ensure that submitted work is his or her own and does not involve any form of academic misconduct.

For the homework assignments, you may consult for guidance, if needed; your instructors lecture notes, the physics department help center, the writing center, your instructor, other physics and astronomy department instructors, other textbooks, or the Internet. Any work that is not explicitly your own must be cited. You may not copy solutions from anywhere. If you are unclear on anything, you are expected to ask your instructor for clarification regarding, but not limited to, collaboration, citations, and plagiarism. Ignorance is not an excuse for breaching academic integrity.

1. What are the $K_x$ and $K_y$ energies for the following elements: Ni(Z=28), Fe(Z=26), Au(Z=79), and Pb(Z=82)? (Please use the equations given in the lecture and not the table of x-ray energies to do the calculation.)
2. What is the ratio of the \(K_\alpha\) energies of uranium (\(Z=92\)) to carbon (\(Z=6\))? (Do not use the table of x-ray energies when doing the calculation.)

3. What is the ratio of the \(K_\beta\) energies of tungsten (\(Z=74\)) to calcium (\(Z=20\))? (Do not use the table of x-ray energies when doing the calculation.)
4. Given the PIXE spectrum of a single element standard shown below, what are the elements in the spectrum?
5. Given the PIXE spectrum of a single element standard shown below, what are the elements in the spectrum?