Name(s): ____________

SUPERSYMMETRY PROJECTS

1. Pick your favorite valise Adinkra, and let L_I, R_I be its signed adjacency matrices. Define

$$V_{IJ} = L_I R_J - L_J R_I, \tag{1}$$

and

$$\widetilde{V}_{IJ} = R_I L_J - R_J L_I. \tag{2}$$

How do V_{IJ} and $\widetilde{V}_{IJ}$ change if we change the order of the bosons? How about if we change the order of the fermions?

2. What is the effect on V_{IJ} and $\widetilde{V}_{IJ}$ of performing a node flip on a boson? How about if you perform a node flip on a fermion? Does it matter which node you flip?

3. Consider the 4D chiral multiplet given in lecture and its 0-brane reduction. If we perform a node flip on the 1D Adinkra is it compatible with the 0-brane reduction from 4 dimensions?

4. Prove that every N-dimensional cube has a dashing where every 2-color square has an odd number of dashed edges.

5. Pick an Adinkra. Find all odd dashings on this Adinkra. If we declare two odd dashings equivalent if we can reverse the sign on a set of nodes, how many equivalence classes are there?

6. Find all Adinkra topologies for a certain N.

7. Find the 1D reduction of the vector or tensor multiplet from 4D.

8. Find gamma matrices that will work in 1+0, 1+1, and 1+2 dimensions.

9. Choose an Adinkra chromotopology. Find all Adinkras with that chromotopology.

10. In Sage, write a function that will take information about an Adinkra and automatically draw the Adinkra (perhaps distinguishing dashed and plain lines with different shades of the same color).

11. Write a detailed solution of one of the exercises you did this week.