**Activity 8.5.2: Cofactors, Determinants and Inverses**

Use the following matrix: .

You are on a team and each team will find det(*A*) = using its 6 cofactor expansions.

For example, det(*A*) using cofactor expansion across the second row:

Keep a record of the cofactors for each matrix element because you will use them later to find the inverse of this matrix. For example, the =

Record the determinant for the six cofactor expansions

1. Across the first row:
2. Example above: across the second row: 14
3. Across the third row:
4. Down the first column:
5. Down the second column:
6. Down the third column:

 Now you will find the inverse of a matrix using a ***matrix of cofactors***. Each entry in the new determinant is the cofactor for the corresponding entry in the original matrix. Leave a lot of space because each entry in the new matrix contains a determinant of a matrix. Your new matrix should look the matrix below. Check to make sure you understand how to find the entries in this matrix.

1. Evaluate each entry, so you that you will have just nine entries.

You now need to move all of the entries that are not on the diagonal to the other side of the diagonal. Check to see that your result matches the one below.

1. The final step is to multiply the matrix by = \_\_\_\_\_. Do so here.
2. Check to see that your final result for the inverse of is correct by using your technology.
3. You can also check by using technology to see what you get when you multiply A by A-1. Write the product here.
4. Also check the product A-1 A using technology and write the product here:

For square matrices *A* and *B*, if , in other words, multiplication is commutative for two matrices that are inverses. We know that matrix multiplication is not in general commutative. Why would we expect the two products above to be the same?