The Trace and Determinant.

1. Find \( p(\lambda) = \det(A - \lambda I) \)

2. Let \( \lambda_1, \lambda_2, \lambda_3 \) be the eigenvalues of \( A \).
   Find (multiply out) \( p(\lambda) = c(\lambda - \lambda_1)(\lambda - \lambda_2)(\lambda - \lambda_3) \).

3. Compare coefficients to see what you discover.
4. List all permutations of \([4] = \{1, 2, 3, 4\}\).

5. Identify the transpositions.

6. Can you factor \((123)\) into transpositions?