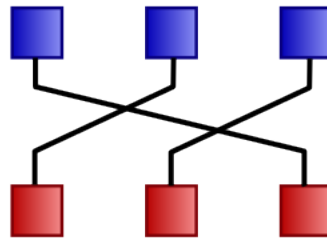


Math/Computer Science Colloquium Series  
**From Matrices to Magic Eight Balls:  
A Look at Three(?) Types of Symmetry**

**Bret Benesh**  
College of St. Benedict

$$\begin{pmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}$$



The word “symmetry” usually calls to mind children’s paper dolls or letters like “A” that can be folded in half, but we can also think of objects that can be rotated to look like themselves, like a circular saw blade or the symbol “✠” (rotate it 90°, and it looks the same). We will generalize these concepts to a notion of symmetry involving the idea of “actions,” and then examine three types of symmetries from three different areas of mathematics: geometry, permutations, and matrices.

**Tuesday, September 8**

**2:45 p.m.**

**Ivers 218**

*Brownies & Cranberry Meatballs!*