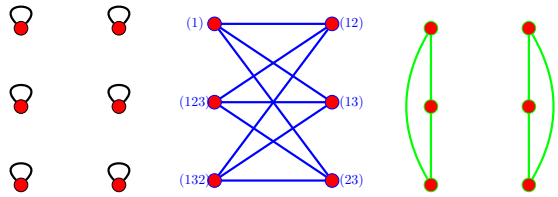
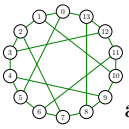
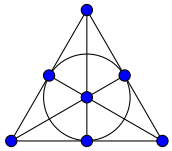
Professor William J. Martin, WPI
RESEARCH INTERESTS

Association Schemes

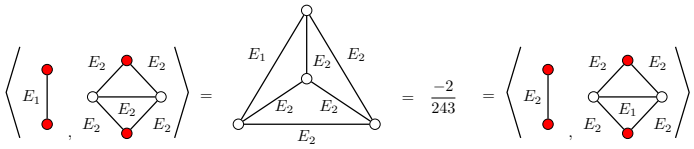
Association schemes can be thought of as highly regular graphs or as matrix algebras closed under the entrywise product. Below is the association scheme of the symmetric group S_3.



- Q-polynomial (or "co-metric") association schemes
- codes and designs in association schemes
- applications to communications, cryptography etc.

These are also connected to extremal graph theory  and finite geometry 

Here is a recent algebraic computation, an inner product of tensors, that disproves a friend's conjecture:



Cryptography

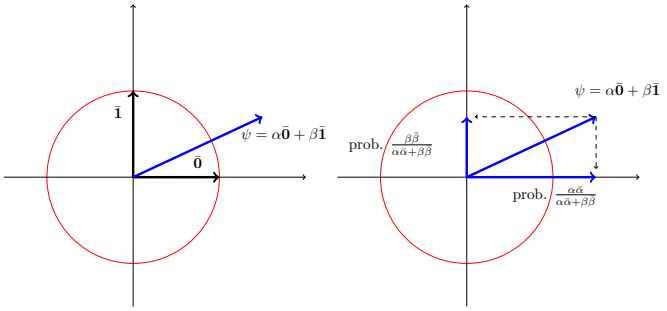
In conjunction with WPI's engineers, I am also working on current topics in security:

- post-quantum cryptosystems
- homomorphic encryption
- side-channel issues

Quantum Infomation

And I try my hand at some problems in quantum information theory:

- quantum walks on graphs
- constructions for ideal quantum measurements



These projects have been consistently funded over the past 20+ years, with current funding from the National Science Foundation.