How many 2-colorings of K5 have no 1-colored K3 ?

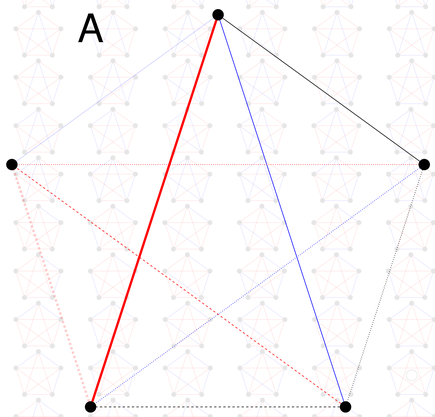
Ramsey Interest Group: Anthony Hengst, Sergei Miles, Isaac Medina Silva, Allison Staley **Faculty Mentor: Jeff Hirst**

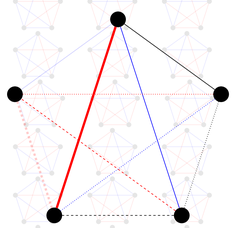
Appalachian State University, Department of Mathematical Sciences, Boone, North Carolina 28608

Introduction

Of the 1024 possible 2-colorings of K5, only 12 have no 1-colored triangles.

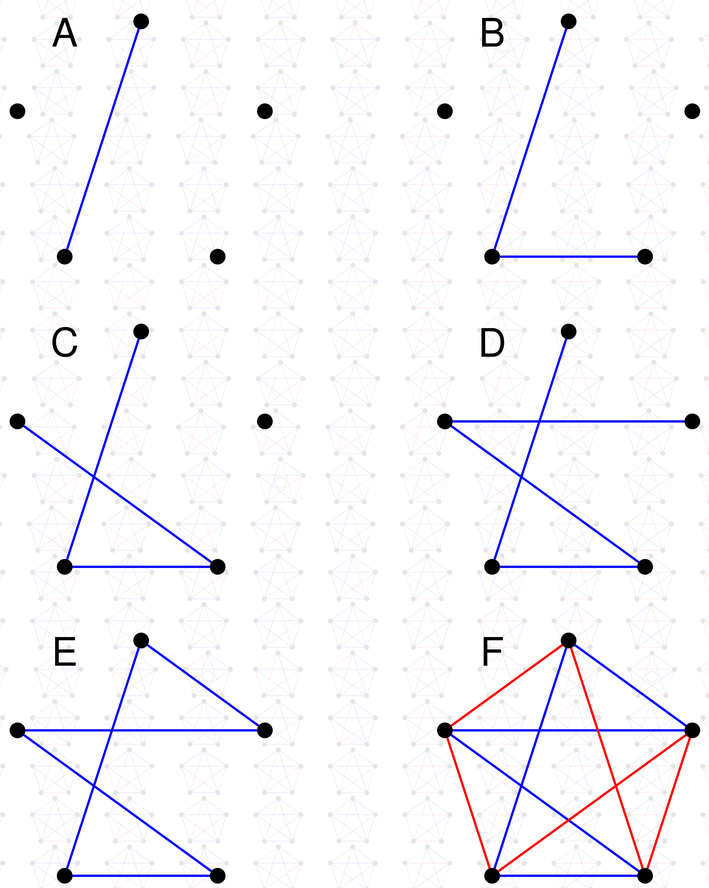
Claim 1





Claim 2

If G has no 1-colored triangles, then G has a 1-colored 5-cycle.

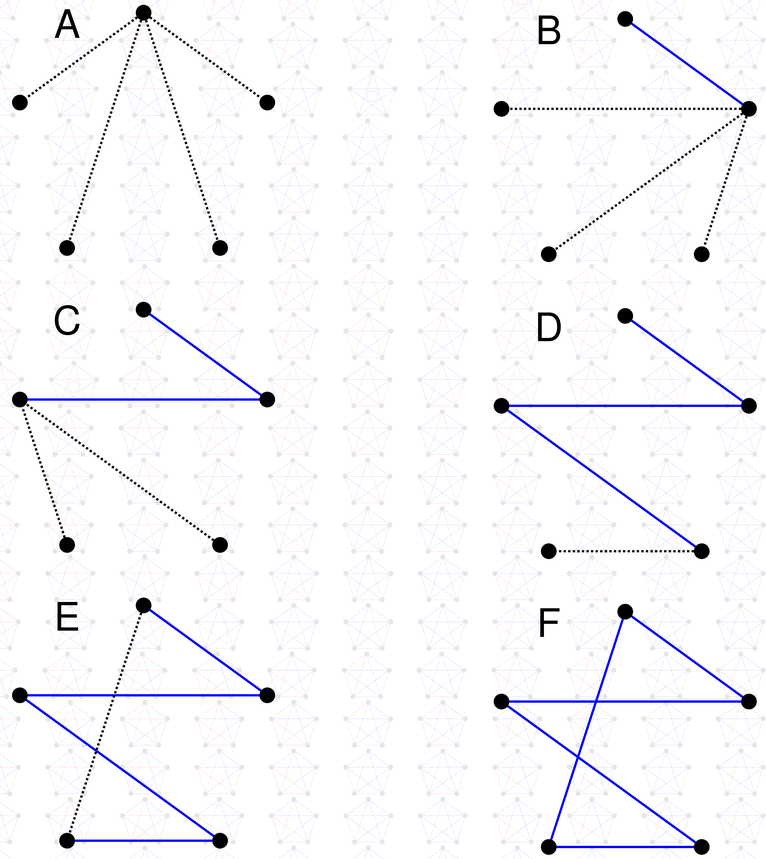


E: 1-colored 5-cycle

F: Remaining edges form a 5-cycle

Claim 3

There are 12 ways to construct a 1-colored 5-cycle.



$$\frac{4 \cdot 3 \cdot 2 \cdot 1 \cdot 1}{2} = 12$$