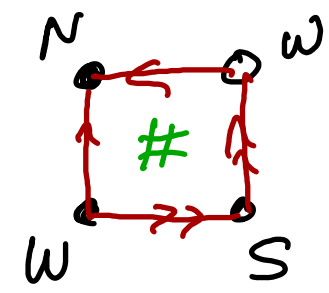
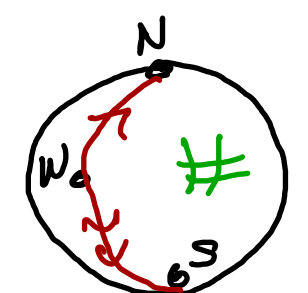
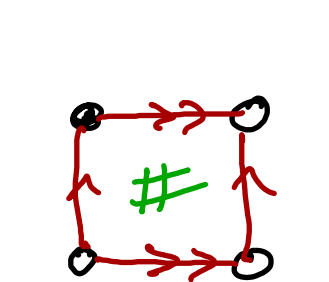

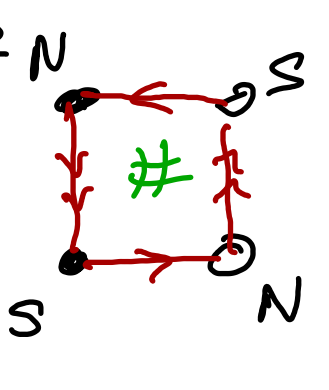
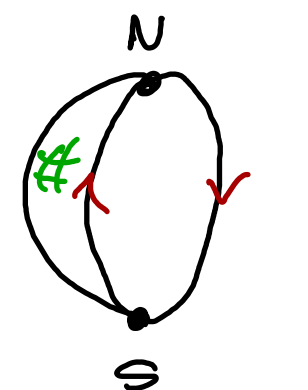


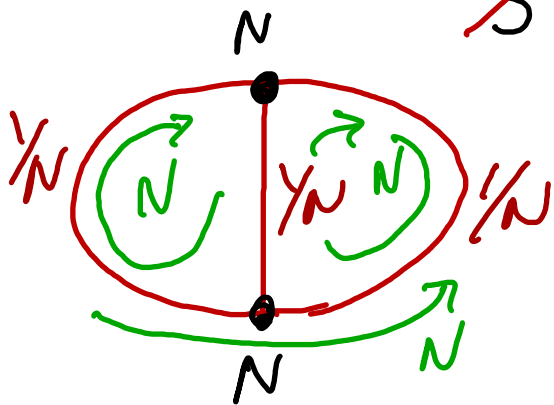
25 Summary: Large N and Topology  
Euler Number: Faces - Edges + Vertices

$S^2$   =   $\chi = F - E + V$   
 $1 - 2 + 3 = 2$

$\pi^2$   =   $\chi = 1 - 2 + 1 = 0$

$\mathbb{RP}^2$   =   $\chi = 1 - 2 + 2 = 1$

Large N Expansion  
~~N~~ colors of quarks



Propagators = Edges  $\propto 1/N$   
Interaction vertices  $\propto N$   
Loop integrals = Faces  $\propto N$

Diagram contributes  $N^{F-E+V} = N^\chi$

Sphere = "Planar" Diagrams  $\propto N^2$

["Projective planar" Diagrams  $\propto N$ ]  
Toroidal Diagrams  $\propto N$

David Gross  
-"orientable"  
theory