The Gauss-Bonnet Theorem

We are now prepared to prove:

<u>Thm</u> (Global Gauss-Bonnet for surfaces without boundary)

Sps. S is a closed and bounded, orientable surface without boundary. Then

$$\underbrace{\iint_S K\,dA}_{\text{geometry}} = \underbrace{2\pi\chi(S)}_{\text{topology}}$$

* Corollary : Since $\iint_S K\,dA$ doesn't depend on γ, neither does $2\pi\chi(S)$

so $\chi(S)$ is well-defined topological invariant.

Ex. $\chi(\text{sphere}) = 2$.

says no matter how you put a metric on sphere, k must be positive at least on some region.