Notes on "The Calabi-Yau Landscape"

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1 Prologue

- Σ Surface
- $g(\Sigma)$ Genus of the surface, i.e. the number of holes.
- $\chi(\Sigma) = 2 2g(\Sigma)$ Euler characteristic
 - Signed alternating sum of the number of independent objects in each dimension. For example, a cube drawn on S^2 has 8 vertices, 12 edges and 6 faces, thus $\chi(\Sigma) = 8 12 + 6 = 2$
 - Betti number, b_i , counts the number of independent algebraic cycles in dimension i.
 - $-\chi(\Sigma) = \sum_{i=0}^{2} b_i$, $b_i = \operatorname{rk}(H_i(\Sigma))$
 - $\chi(\Sigma) = \frac{1}{2\pi} \int_{\Sigma} R$
 - * R Ricci curvature
 - $-\chi(\Sigma) > 0$: Spherical geometry. Positive curvature
 - $\chi(\Sigma)=0:$ flat/torus geometry. Ricci flat.
 - $-\chi(\Sigma)$ < 0: hyperbolic geometry. Negative curvature

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